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The Public Lighting Tables of the American Meter Company will be found in the page advertisement of that Company.

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[OFFICIAL NOTICE.]

Annual Meeting, Wisconsin Gas Association.

WISCONSIN GAS ASSOCIATION,
OFFICE OF THE SECRETARY,
RACINE, WIS., April 25, 1907.

To the Members of the Wisconsin Gas Association: The next annual convention of this Association will be held in Milwaukee, Wis., with headquarters at the Hotel Pfister, Wednesday, the 15th, and Thursday, the 16th, days of May next. Respectfully yours,

HENRY H. HYDE, Secretary.

BRIEFLY TOLD.

REGULAR MEETING, AM. INST. ELECTRICAL ENGINEERS.—Through the courtesy of Mr. Ralph W. Pope, Secretary of the American Institute of Electrical Engineers, we are informed that the last regular meeting of the Institute was held in The Engineers' Building, 33 West 39th street, New York, the evening of last Friday. Mr. S. P. Grace, Chief Engineer of the Central District and Printing Telegraph Company, of Pittsburgh, Pa., presented a very exhaustive and entertaining paper on the subject of "The Telephone Wire Plant," which was responsible for a very interesting discussion. The paper by Mr. D. McFarlan Moore, Chief Engineer and General Manager of the Moore Electrical Company, Newark, N. J., on "Light from Gaseous Conductors within Glass Tubes," with especial reference to the Moore Light, was very well received. It was especially practical in that the lecture room was illuminated by means of the Moore tube light, and candor compels the admission that the room was well lighted. Of course, we do not know at what cost. The members had occasion to thoroughly appreciate and enjoy the completeness and comfort of two of the lecture halls, for the Grace presentation was read in the Auditorium (third floor) of the Engineers' Building, while the Moore number was taken in Assembly Room, No. 2, Fifth floor. Everything was as it should be, in fact.

A LOVING CUP FOR MR. W. L. COSGROVE.—Some time ago we had occasion to report that Mr. W. L. Cosgrove would voluntarily retire from the position of chief executive of the Atlanta (Ga.) Gas Light Company on June 1st, and we then said a word or two about the esteem in which that gentleman was held by his friends and his men—in fact, the latter are also quite the former. Now we have to report a token and the speech that accompanied it, given to him by "his men" the morning of the 22d inst. The presentation of the memento of their goodwill—it was a loving cup of heavy, solid silver, 20 inches in height the bowl being done in gold, the base being a beautiful specimen of polished ebony, suitably inscribed—was through a speech made by Mr. Edward C. Brewer, the Company's Cashier, in the course of which the speaker said: "You carry with you the good wishes of the employees of this Company, and each and every one of us regrets that you are going. You are probably unaware how well you have builded in the hearts of your men. You can hardly know the deep and lasting

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impression you have made on the minds of our fellow employees. With signal ability and great success you have brought this Company up from a peanut stand proposition to a level, and to our minds above the level, of any similar corporation in the United States; and in doing so, in all your relations with the employees, and with the general public as well, your efforts to be just, to be fair and square, to scorn narrowmindedness, to do the right thing at the right time—have found in your employees deep and tender appreciation. On behalf of our constituents we present to you this loving cup, and wish that it may ever be full of, and running over with, happiness for Mrs. Cosgrove and yourself." When Mr. Brewer finished speaking, Mr. Cosgrove falteringly said: "I don't know just what to say. I am afraid to try to say too much, my heart may get too near my throat. I have known all of you a good many years—most of you ever since I came here 17 years ago to take charge. It doesn't seem near that long, for my stay in Atlanta has been so pleasant. In that day and time we had a little bit of an office, and I stood at an upright desk and did my work under a skylight. The pipe 'jointings' in that day and time were made out of lead bullets, which the plowmen and farm hands ploughed out of the fields in and around the city and brought to the Company's office, where they were kept in a tin bucket. Things have changed since then. But in the changing I have found that a spirit of conciliation, a spirit of fairness, a spirit of compromise, a desire to be just and square with the public as well as working with the Company's interest at heart, was best. I have made friends, both business and social, and it is with sincere regret that I shall leave them. You and they have been largely responsible for the success which has attended the upbuilding of the Company. I cannot think of taking all the credit, for you have done your duty well. I want to thank you for this loving cup. It is the handsomest one I have ever seen. I cannot take it with me, but the memory of this occasion will remain with me forever, and when I am traveling abroad my thoughts will often revert to you men here at home. I thank you."

CURRENT COMMENT.—

THE Gas Bench Construction Company, of St. Louis, Mo., informs us that it has been awarded a contract to supply the material needed for the resetting of 16 benches in the plant of the Laclede Gas Light Company.

WITH exceeding regret we report the death of Mr. Thomas B. Riter, President of the Riter-Conley Manufacturing Company, of Pittsburgh, Pa., whose demise occurred at his home, Ellsworth and Negley avenue, the afternoon of the 23d inst. The funeral services were held in his late residence the afternoon of Thursday last. Later on we will give a suitable narrative respecting his long and useful life.

WE are also obliged to announce the death of Mr. Theodore D. Buhl, late President of the Buhl Stamping Company and the founder and President of the Detroit Meter Company, both of Detroit, Mich. Mr. Buhl passed away the morning of the 7th inst.

WE are in receipt of a full copy of the decision rendered by Mr. F. J. Allen, Commissioner of Patents, in the instance of the interference case entitled, "Barstow Stove Company *vs.* American Stove Company, *vs.* Detroit Stove Works," which was a contention in essence over the right of the Detroit Stove Works to register the word "Jewel" as a trade-mark for stoves. Notable extracts from the decision are:

"As between the Detroit Stove Works and the American Stove Company, the former was the first to adopt and continuously use the mark in issue, and therefore the latter cannot prevail."

"It not having been shown that either the Barstow Stove Company or the Union Stove Works adopted and used in trade the mark at issue prior to the date of adoption and use thereof by the Detroit Stove Works, it is not established that either of the former Companies is owner of this mark."

ON the 15th inst. the Olympia (Wash.) City Council granted a franchise to Mr. W. F. Dole, of Portland, under which the latter is to construct a gas plant in the first named place. A certified check for $1,000 has been deposited with the City Treasurer as a guarantee that the agreed upon contract will be completed. The corporation is to be known as the Olympia Gas and Fire Company, and its promoters guarantee to supply gas before November next.

THE Citizens Gas Company, of Kankakee, Ills., has been purchased by a Milwaukee-Chicago syndicate, of which Col. Edward G. Pratt is the Vice-President and General Manager. This plant was owned by Messrs. Street, Wykes & Co., of New York.

[Furnished by the Secretary.—Continued from page 671.]

PROCEEDINGS, THIRD ANNUAL MEETING, ILLINOIS GAS ASSOCIATION.

HELD IN NATIONAL HOTEL, PEORIA, ILLS., MARCH 20 AND 21, 1907.

FIRST DAY—AFTERNOON SESSION.

Discussion on the Paper by Mr. A. D. Mackie, on "New Business Methods."[1]

The President—I think Mr. Quackenbush has prepared a discussion of this excellent paper. We would be glad to hear from him.

Mr. C. H. Quackenbush—I promised to prepare a discussion on the paper, but unfortunately did not see it until yesterday morning and did not then get a chance to read and digest it on an empty stomach, which is rather difficult. I have, however, made a few notes on the paper. I do not think any other branch of the gas business offers such opportunities for originality as are right in the new business department. I think, perhaps, every man in this room has some original thought on this proposition and if he would only let us have it it would do us all a lot of good. I do not quite agree with his qualifications for a salesman, nor do I know whether or not it is his company's plan to have its salesmen employed the entire year. With us our plan is to have salesmen, perhaps one or two, for the full season, and during the busy season employ a lot of live men to work for perhaps 3 or 4 months. It is difficult to employ men in that way and give them the insight into the business they should have, and it is impossible, almost, that those salesmen will understand all the little points about the gas arrangements for lights, etc. I think the more a salesman understands about the business the better salesman he is. I think, as said in the paper, that many times the adjustment of a burner or light, or a little wrinkle on the gas stove, will do a great deal as an entering wedge to secure an order for something else, and thus increase the number of gas appliances in the house. A great number of our solicitors are only employed part of the year, and much depends on the first impression the solicitor makes. I do not think any solicitor when he first takes a position will do a great deal for your company in reaching out for gas stoves. I know that a great many companies nowadays use the commission basis, where the solicitor makes more selling a stove than they do after it is set. I think the suggestion of a club is a very good one. I also think, where the town is not large enough to have one of those clubs, it would be a good plan for the manager to meet his solicitors nearly every morning and spend ½ or ¾ of an hour with them, going over the previous day's work, and find out where there is a particular order, if any, that one solicitor came pretty near getting, but did not get, and send another one for it. I think it does a great deal of good to make it a point to see each solicitor personally and commend him for some particular good job of work he has landed, say during the week before. I would like to ask Mr. Mackie a question or two with regard to gas stoves. What does he consider a fair profit in selling stoves and fuel appliances—what per cent. above the cost of the appliances he would sell at? Several companies are now considering the matter of selling gas appliances at such an advance cost as would pay for the operating expenses of the business department, including advertising. Does he follow out anywhere near that suggestion? Also, under the sub-head "Illuminating House Piping," Mr. Mackie seems to have overlooked one good proposition in house lighting. We do house piping in the rainy season when sales are slack, so that when the next gas stove season comes we have a well organized fitting department with which we can do the work very quickly. As to the question of advertising, as the paper says, it is pretty hard to draw the line anywhere thereon. In Peoria they can use the newspapers to a great deal better advantage than we can. I am located in a suburb of St. Louis, Mo., and in the latter place the papers have larger circulations than the papers published in East St. Louis. I think a great deal of newspaper advertising. It is simply a question of how much newspaper advertising will do for us under certain conditions. I appreciate the paper very much indeed.

Mr. Mackie—Replying to Mr. Quackenbush's questions on stoves. It would be an ideal condition if you could make the appliance department self-supporting. We get a profit of above 25 per cent. on our gas stoves and appliances, except in special instances. Our Company allows a certain expenditure for promoting new business, fixed each year upon the basis of the business done the year before. The loss of illuminating house piping is charged up to new business. Advertising comes out of the new business department, and loss on new installa-

1. For the text of the paper, see *ante*, p. 669.

tion of gas arcs comes out of the new business department as well as the loss on arc maintenance. In regard to the illuminating house piping, we push this business in the off-fuel season too. We aim to keep our fitters on all year. Last year we arranged to keep 2 solicitors busy all winter on gas arc lights and illuminating house piping. The amount of money expended for advertising should be based on local conditions. If the field is large with plenty of business in sight, more money should be spent than if the field were limited. If the latter the amount spent should be based on the ability to pay.

Mr. Quackenbush—One more point I would like to ask about. I think a proper demonstration is quite necessary after the appliance is set. I would like to ask Mr. Mackie what course he follows in demonstrating the appliances that have been set?

Mr. Mackie—We will follow the same course this year that we did in 1906. A woman demonstrator who understands the operation of the stove follows up every new set, and she explains it; she goes back, if necessary, and helps do a baking. I find this an excellent plan.

Mr. Goss—I appreciate very much Mr. Mackie's paper. I am thinking some of putting a solicitor on for new appliances we have just installed, and I would like very much to hear from somebody on that subject as to whether it would be a good idea, whether it would be a paying proposition, to follow up an appliance just installed, such as ranges or cooking appliances of any kind.

Mr. Persons—In traveling through the country we find that different methods of doing business are required in different localities. It is a good deal like the tariff—it is a local question. Everybody in business finds if one thing is not successful the only thing to try is something else. Something will succeed, sure, and if you are not on the right track now, try something else. When in Denver a few weeks ago I attended a session of the solicitors of the Company there, which is held every Monday morning. The first Monday morning of each month—the city is divided into 13 districts—each solicitor writes on a blackboad what his prospects are for the month. Then that month is divided into 4 or 5 weeks, according to the calendar, and each Monday morning each solicitor reports what he has secured out of his expectations. Each one of those districts perhaps has 3 or 4 solicitors, with one chief solicitor, and they shift them around. If one solicitor does not succeed in getting business from one locality he is given another place in which to work, and someone else is put in his place, and the plan has been very successful. I had an experience in running an appliance store a few years ago. In one district the women mostly did their own work, and I succeeded in finding one solicitor—I alway scalled him the back-door man—who, if he had gone to the front door, would have been arrested as a tramp, but who would go into the kitchen. He knew every woman, and he could sell gas ranges, I tell you. If I had put him into any other part of the city he would not have been successful. I don't think anybody can hire a solicitor and know he is going to make a success. If they are started right they may come out all right. I have in mind one city where two solicitors last year made $4,500 apiece working on a small salary and a commission. I believe that is the way to hire solicitors; pay them a small, living salary, then put them on their resources. I believe that will succeed in every town, perhaps not so well in small towns as in larger cities. Mr. Mackie should have a hearty vote of thanks for his paper, for he has covered the ground fully, especially in the advertising part of it; but advertising without personal solicitation doesn't amount to much.

Mr. Parker—Mr. Mackie has certainly written a valuable paper and especially so if digested thoroughly with reference to the point that the solicitor should have a thorough knowledge of the article he is offering, and set forth the good points of it in order to clinch a sale. I think the solicitor should be instructed that in doing so he should adhere strictly to the truth.

Mr. Mackie—That is understood in the gas business. [Laughter.]

Mr. Parker—I don't know whether the salesmen would do it, but if they do that they will be all right and avoid piling up lots of unnecessary work later on. If you will change your solicitors and bring in the deadwood you have you can do nothing with and put out new solicitors it will increase your business. There is nothing that I can add to the paper. No doubt the commercial end of the gas business will be the big end of the business—there is no question about that, and there are different ways and methods—it is a question of education. Half the salesmen you pick up are not salesmen. I had a letter the other day from a man wishing an appointment as solicitor. He said he would like to work almost entirely on a commission if he could. He said he could do lots of work evenings and meet the husbands with their wives, which is a valuable idea and a good one. There is no doubt about the value of employing solicitors on a commission. If a man gets a salary he exerts himself just enough to keep in the good graces of the company. I know the commission-and-salary plan is the proper basis on which to put a solicitor out. The first company to which I took this letter that the gentleman wrote me, and presented it said, "He is a man that we can use nicely;" and he earned over $3,000 last year mostly on a commission. It is absolutely a question of education, wherefore you see the necessity of having a business management competent to instruct these men. Their standard will not be set any higher than that set by the business manager for them. The commercial end of the gas business is getting to be a very large part of the gas business. Mr. Mackie's paper covers a broad and valuable subject.

Mr. Mackie—I recall a unique advertising scheme which we tried last year in Springfield. We put up tents in different parts of the city on vacant lots and connected up a couple of gas stoves and had demonstrators and solicitors there. We found we could get women in the tents in their own neighborhood whom we could not get down town to our office. I remember one instance where our solicitors had worked a district thoroughly, had placed quite a number of stoves and had practically given it up. We set up the tent and placed 6 more stoves in one afternoon above the number already sold. We tried that in two other sections of the city with about the same satisfactory result. Regarding this salary and commission proposition: We give our solicitors credit for sales closed in their territory within 30 days after they call. They turn in their cards, and if the sale is closed in the office within 30 days they get credit for it just the same. Another advertising scheme we tried last year. We advertised for 6 days, I believe, "One dollar special reduction on gas stoves on a coupon scheme," and sold some 30 stoves under it. The following month during the same time, we used the same space in the newspaper, spending a like sum of money in advertising, "To give away two 25-cent circus tickets with each stove sold before a certain date," and we sold 97 stoves. [Laughter.] Which goes to prove the people like to be humbugged in a way and they would rather have two 25-cent circus tickets than $1 in money.

Mr. Rice—One point in Mr. Mackie's paper I would like to see emphasized is the flat price of selling stoves. I think it an important point. I had an opportunity the other day of looking over the business policy of a small company in a city of about 18,000 people. Business was not very brisk, and I asked the manager about his business policy. "Oh," he said, "I have a very liberal business policy, very liberal; we sell stoves practically at cost." I asked how about the connection, and he said, "We connect them at so much per foot." I asked how he piped houses and he said, "We pipe houses at so much per foot and sell fixtures nearly at cost." I asked him how he put on arc lamps? He said, "Well, we sell arc lamps pretty nearly at cost, and if there is any piping to be done we pipe at so much per foot." That is all very well; but if you are installing gas piping at so much per foot, when a solicitor enters a house he is up against the proposition at once, how many feet of piping there has to be. It is a great deal more difficult to get the lady of the house to understand that the house will be piped cheaply, than if he could tell her then and there how much it would cost to pipe and put the fixtures in the house. Or if a customer in the gas office tackles the clerk on the floor with reference to the cost of piping the house, if the clerk can say then and there, "You have so many rooms, we can pipe it for so much money;" it is much better than to have the clerk say, "We will send a man up to measure your house and we assure you it is not going to cost very much." That is another thing entirely. In the territory of the Western United Gas and Electric Company, when planning a house piping campaign, that point was thoroughly considered and we decided absolutely on a flat price. We have two propositions, two grades of fixtures, all of which are thoroughly catalogued and illustrated, and the solicitors have them with them. For one grade of fixtures we pipe houses at $2.50 per room; for the other grade we pipe at $3.50 per room. At those prices you can sell at a profit, not every month, for in some towns we lose a little; but on the average for a year we make something in every town in which that scheme has been tried. For that price the customer gets a 3-light fixture in the parlor, a 2-light fixture in the living room, 2 in the dining room, a pendant in the kitchen and brackets in the bed chambers. On a proposition of that kind we get lots of business, while if we had to make an estimate the people would have lost interest in the meantime. On that proposition we piped last year some 2,600 houses and put up some 4,000 gas ranges. We are now piping about 250 houses a month.

The Secretary—Mr. Rice, to my mind, has emphasized a very important point in this flat price proposition which has been borne out by our experience in Peoria. You know the plumbers' prices are always supposed to be very high. The average person looks at a plumber's price the same as he looks at his monthly gas bills. The price of the

plumbers here for piping houses was 17 cents per foot. When we started in the business we made a price of $2.50 per room. The people considered our price remarkably low and in something like a year we piped 1,000 houses. When we came to average our figures we found that our average per room was less than 15 feet, so we got nearly the 17 cents per foot that the plumbers charged, yet the people considered 17 cents a foot very high and $2.50 a room very reasonable. We did a large amount of business on that basis. The flat price proposition is a fixed price, so when you are ready to do business with a customer you can tell him exactly what it will cost him and when you sell on small payments and long time you get the business every time.

Mr. Quackenbush—I do not agree with the idea of charging a flat price per room for both piping and fixtures. In the first place I do not think it gives quite leeway enough for a proper display of fixtures. I believe in piping rooms for a certain fixed price per outlet, but our solicitors carry with them catalogues and illustrations of our different lines of fixtures and can make an estimate right on the job as to how much that particular work will cost the consumer. The consumer has the choice of a large collection of fixtures, and I think they are better satisfied on that plan, and we don't have to handle any one particular line of fixtures.

The Secretary—I did not want to give out the impression that the price of $2.50 per room included the fixtures. That covers the piping only and then the customer selects the fixtures desired. The solicitor has cuts of the different fixtures we handle, the price of fixtures depending on the number of lights selected for each room and the kind of fixtures.

Mr. Quackenbush—The $2.50 and $3.50 per room spoken of by Mr. Rice is our standard proposition. If a fixture does not appeal to a customer we have plenty of other fixtures from which he can choose. But that is our standard price, taking the average small house, and if any customer wants anything different he can get it from us. Our idea was to have something that did not involve any estimate at all for the average small house and we gather them in at a pretty lively rate.

Mr. Mackie—We have a standard line of fixtures for a 5-room house which we advertise for $13, this includes piping and two 2-light pendants for front rooms, a 1-light pendant for the kitchen and 2 side lights for bed rooms; in addition to this standard line we carry 4 or 5 other lines of fixtures. We have an exchange value on the standard fixtures, a certain price fixed; if the customer wishes another fixture shown in our salesroom it only takes a short time to figure up and give them a price on any other fixture we carry.

Mr. Barron—I have had a good deal of experience in supplying gas companies with fixtures on the installment plan, and I am selling gas companies our goods that wish them to run on that basis $2.50 per room on figuring the cost of finishing and including fixtures.

Mr. A. J. Goss—We make money, figuring at $1.50 per room. Of course we figure about 10 or 15-foot rooms as the limit. Say a 4-room house, we pipe for $5, which would be $1.25 a room. That would not include fixtures, which we sell at 50 per cent. profit and make money.

The President—If any other gentlemen have any ideas on this subject we would like to hear from them. It is a very excellent paper and if the ideas therein suggested are followed out it is bound to produce good results.

Mr. G. E. Fish—I would ask whether it would not bring up a good deal of contention with the plumbers to make it a practice to pipe houses at such a cheap rate?

The Secretary—We had that to contend with in Peoria, and for a long time we did no piping of houses whatever on account of the objections raised by the plumbers; but finally we told them we were going into it but we would do it in such a manner they could not complain. We told them what we were going to do; that they were charging 17 cents a foot and we were going to put piping in at $2.50 per room, and we have not heard a word of complaint from them, as a matter of fact the plumbers say now that they prefer we do all the gas piping in the city; that they have their hands full of other work.

Mr. Quackenbush—Plumbers hate above all things to go into an old house to put in pipes, and if they know the gas company will do it they are glad to get out of it.

The Secretary—When we started in the house piping business one of the plumbing houses had just changed hands, and the man who bought out the establishment bought a very large lot of elaborate fixtures with it and had a lot of money tied up, As soon as he found out we were doing house piping he made it a practice to follow up our solicitors. As we had but one price, he knew what our price was, and he always cut our price slightly in order to work off his fixtures. He told me some time afterwards that he had been enabled to work off his entire stock of fixtures at a price which paid him a profit, fixtures that he thought he never would get rid of; at the same time he underbid our price and satisfied the customer.

Mr. Persons—This is an important subject, and I see a few men in this room who attended gas conventions not so many years ago who made the statement that the money was all made in the retort house. I see a couple of them over there now. [Laughter.] We have had to learn from the rising generation that the money is made in selling the gas. This is too important a subject to drop very early, and I want to add my vote of thanks to Mr. Mackie when the proper time comes.

Mr. John Parker—Mr. Edds, of the Indianapolis Gas Company, told me a short time ago that last summer he had placed demonstrators and gas stoves in every lecture room in all the churches in Indianapolis, some lady belonging to each church doing the demonstrating; that great interest was manifested among the ladies of the different churches and the results far exceeded his expectations. I think such a method could be profitably carried out in cities like Peoria, Joliet, East St. Louis, etc., where there are several churches. All classes are reached that way and Mr. Edds spoke very highly of that method.

The President—If there are no others who desire to make any remarks on this subject, I will ask Mr. Mackie to close the discussion, if he desires to do so.

Mr. Mackie—I have nothing further to add except to thank the gentlemen for their courtesy and the points brought out in the discussion. I know I have picked up quite a few valuable points, and I trust the others have.

Mr. Persons—I move that a vote of thanks be tendered Mr. Mackie for his paper. [Seconded and carried.]

The President—We have ample time this afternoon to hear another paper and I will ask Mr. C. B. Strohn, of Elgin, Ills., to read his paper.

Mr. C. B. Strohn—Before beginning to read this paper I wish to call attention to one or two changes. For instance, in describing the buildings I mention some doors to the wagon shed. Now, the sketch shows there are no doors and this is simply a contradiction. In another place I mention the fact that in operating the shop machine the fitters and helpers had access to the machine. Later on I mention the fact that 1 man has charge of the machine, and that is the correct statement. At the end of the paper is a note attached by the Secretary as follows: "So many cuts were submitted with this paper that it was impossible to insert them all at this time. Arrangements will be made to publish them in the complete report of the proceedings." To give you some idea of what is meant by the number of cuts I will call your attention to them as arranged on the wall behind me.

Mr. Strohn then read the following paper, entitled,

THE OPERATION OF AN IDEAL SHOP.

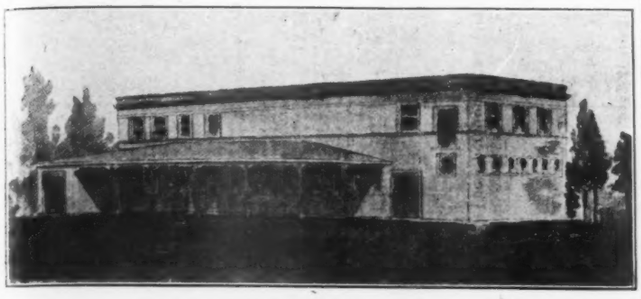
Shortly after this work was commenced, it became evident that the word "Ideal" might better have been omitted. The system of operation as outlined in the following paragraphs is the best known to the writer, consequently it is ideal from his point of view. However, one needs to consult but a few gas men to be convinced that no system is ideal under all conditions. Local transportation facilities, development of the city, nature of consumers and quality of labor would naturally affect the mode of operating.

This shop is supposed to be located in a town of 60,000 inhabitants, with 100 miles of main and 8,000 consumers. The cost of buildings and equipment has been carefully considered, and nothing in the guise of luxury is recommended. The discussion will doubtless bring up points which should have received more attention, or matters that are completely lost sight of. In this connection let it be understood that the writer expects all discussion to benefit him as much, if not more, than those who will have heard it. The subject is taken up step-by-step, under the following heads: Buildings, Employees, Tools and Equipment, The Handling of Orders. All of the printed forms are numbered; being referred to in this way as the paper progresses.

Buildings.—For proper heating and ventilating, and for the convenient handling of material to and from the shop, it is located on a level with the street, as a basement shop is not considered economical from the standpoint of health and convenience.

The amount of ground necessary to accommodate the shop buildings is a space 72 by 122 feet. These buildings are 2-story brick excepting the wagon shed, which is a 1-story, frame structure. Several sketches accompany this description so that a clearer conception may be had of locations and arrangements. The description is not intended to be as precise as that furnished by an architect, a general idea being considered sufficient for this purpose.

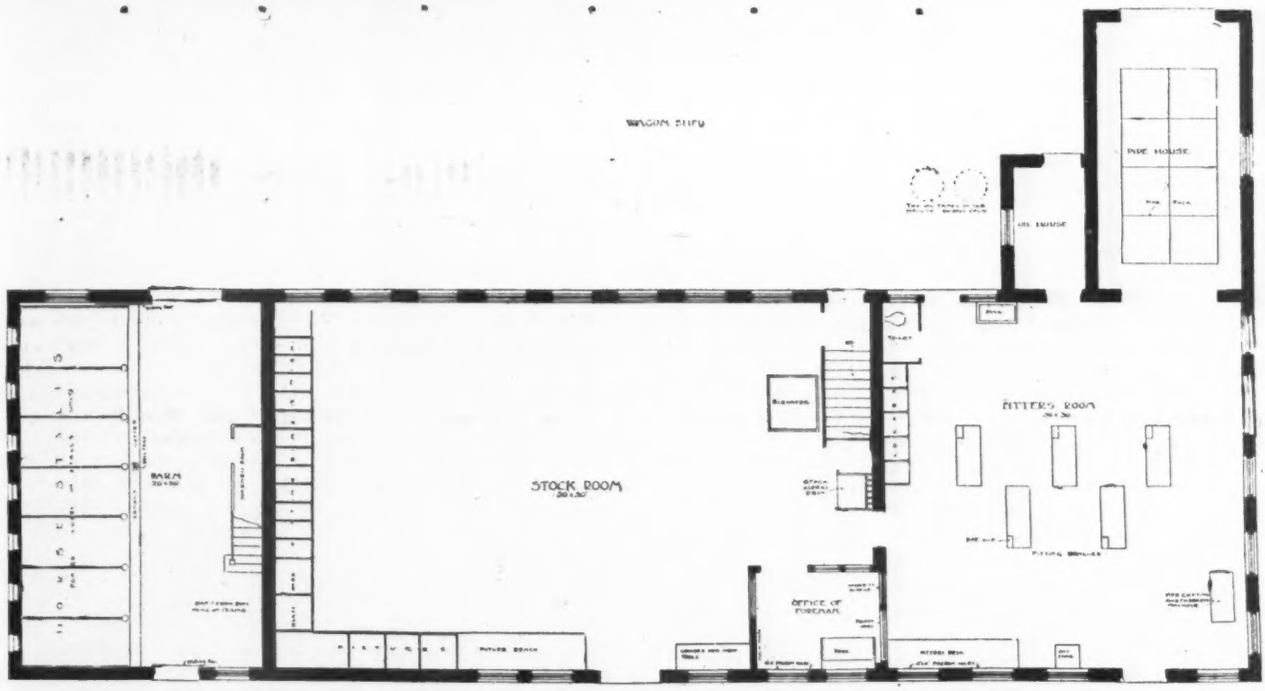
The lower story of the shop is divided into the fitters' room, 30 by 30



Perspective View of Building.

room for 600 standard, double oven ranges. However, space must be allowed for hot plates, heaters, elevated ovens, arc lamps and special appliances. The upper storeroom contains about 12,000 cubic feet of storage room. It must necessarily be taken into consideration that the street department is allowed to utilize a large portion of the storeroom space, although no mention is made of it in this description.

The floors in the first story are of cement, with the exception of stalls in the barn; these are clay. The floors in the second story are made of reinforced concrete supported by steel I-beams. The first story is 12 feet high and the second 10 feet. Nearly all of the windows are 3½ by 6 feet. For the purpose of receiving as much sunlight as possible, windows are placed as close together as the rules of good construction will permit. All the large doors are of the double, sliding type, 5 feet wide.



Plan of First Floor.

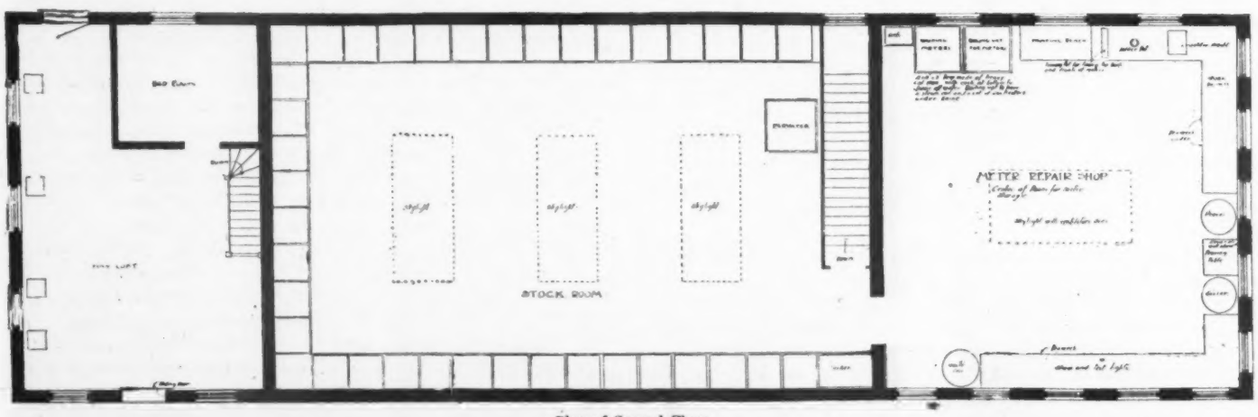
feet, stock room, 30 by 50 feet, foreman's office 8 by 10 feet, pipe house, 12 by 22 feet, oil house, 6 by 10 feet, barn 20 by 30 feet and wagon shed, 68 by 22 feet.

Part of the upper story is divided into a meter shop, 30 by 30 feet, and a storeroom, 50 by 30 feet, for arc lamps, glassware, fixtures and material, of which it is occasionally found necessary to possess a large stock. The remaining portion of the second floor, 20 by 30 feet, serves as a hay loft, in the northwest corner of which is a hostler's room, 8 by 12 feet.

After allowing for a convenient number of aisles, the lower stock room, not including bins, affords 10,000 cubic feet of space, or enough

The small doors are the ordinary heavy swinging style, opening inward. The roofs are covered with a well formed combination of tar and gravel.

The building receives its heat from coils supplied with steam from a heating plant. Gas lights are used in every part excepting the oil room, wagon shed and barn, electric lights at these points being installed for safety. Thirty fire extinguishers are distributed around the buildings, and four 2-inch water connections are arranged so that by use of a hose any part can be quickly reached.



Plan of Second Floor.

Foreman's Office.—By referring to the sketch it will be noticed that the foreman's office is centrally located. Its four walls, including door,

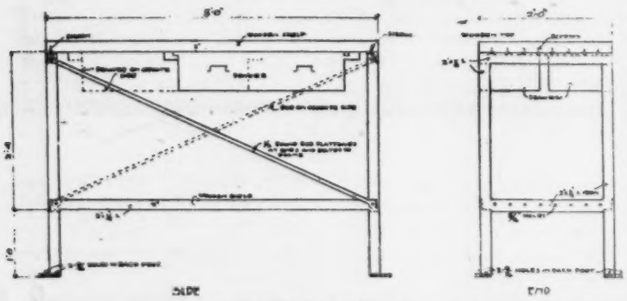
are glass from ceiling down to within 4 feet of the floor. This enable the foreman to watch proceedings in the stock room, in the fitters' room and out doors, where wagons are continually passing along the driveway. He uses an ordinary flat desk with several drawers in it, as a roll top desk with pigeon holes would obstruct his view. Arranged on the wall below the glass line are a large number of small boxes, hooks and spindles. These act as files for job tickets, orders and memoranda necessary for proper handling of the work. On another wall are displayed maps showing location of mains, drips and valves. Several lists of appliances, with descriptions and prices of same, are kept in the foreman's office carefully framed. His telephone is so arranged that he can talk with anyone in the gas office or with any one of his fitters who may call up asking for information.

In the wall between the foreman's office and fitters' room is a small sliding window, 12 by 6 inches, through which are passed all completed tickets and orders.

Fitters' Room.—On the west side of the fitters' room are stacked two tiers of lockers, every one 18 by 24 inches, made of fine wire mesh, securely fastened by a padlock. Every employee has certain articles of clothing and other things which he wishes to place under lock and key; consequently lockers are furnished. It has been found that, if a man has a place to lock up his belongings, there will be less trouble regarding thefts, and the management will be called upon less often to adjust differences. Sketch shows the sink and closet on west side also.

On the south side is situated the fitters' desk, 11 by 2 feet, used by the fitters in making out their reports, and in performing whatever clerical work is necessary. Directly above the desk is a long line of small boxes, 4 by 2 by 2 inches, every one bearing a fitter's name. In these boxes are to be found job tickets for the men to take out every morning. All tickets with necessary instructions attached are checked out by the foreman before they are placed in the boxes at the opening of the day. Further along on the south wall is an ordinary gas stove used by the fitters who eat lunch in the shop. A double door on this same side is an opening through which all pipe and other material, already checked out of the stock room, is loaded into the wagons.

On the east side is the pipe machine with the die rack on nearby wall. In the center are 5 benches used for making up pipe to be delivered to



Design for a Fitter's Bench.

the houses and installed. There is no bin for small pieces of pipe. They are thrown upon the floor alongside the machine, and in this way are used up much more quickly. Further along on the east wall is the bulletin board. Upon this board are posted all special notices and communications delivered to the employees from day to day. Hanging in neat frames are the shop rules, blue prints of special connections, sketches of wrinkles, price lists, cuts and descriptions of all stove parts and fittings.

Stock Room.—On the east walls of the stock room are placed several bins for stove repairs, the closed stairway leading to the second floor and the stock clerk's desk. This desk is 3 feet square with flat top. A sufficient number of boxes, hooks and spindles enable the stock clerk to care for his requisitions, tickets and reports. Just south of the fitter's desk is the door leading from the fitters' room to the stock room. This is a double door on the lower half of which is a shelf used for the delivery of stock by the clerk. To avoid delay in waiting for stock, a push button is used, and the clerk has orders to respond quickly to the bell at all times. Meters and stock to be stored above are raised on a 4½ by 5 foot elevator, shown on sketch near stairway and clerk's desk. The north wall is perfectly plain. Stoves and similar appliances are piled up at this ponit, with proper aisles left at intervals.

The west end contains a tier of fitting bins, 154 in number, every one 36 inches deep, 18 inches wide and 12 inches high. The stock man gains access to all of them by the use of a sliding ladder, such as found in hardware stores. Continuing further along are 22 bins, 3 feet square and 12 inches deep.

In the south wall are built 66 bins, 3 feet square. These are used for storing fixtures. Adjoining the bins is the bench for assembling fixtures. Just east of this is the large double door through which all heavy stock is checked in and out by the stock clerk. Directly west of the foreman's room is a large locker or cupboard 5 feet long, 2 feet wide and 6 feet high, for the purpose of storing all surplus and unused tools. Next to this cupboard is a small set of bins for assorted stove bolts, arc lamps parts and lamp repairs.

Meter Room.—The stairway at the east end of the stock room leads to the meter room on the second floor. This stairway is closed and has but one entrance. This is from the outside. By this arrangement the meter men must keep out of the fitters' room and the fitters must keep out of the meter room. A work bench, two provers, a proving table, and a bank of test lights are installed on the east side. [See sketch.] On the south side, under the test lights, is a long bench filled with drawers for tools and repair parts. At the west end of the bench is a waste can for oily rags, old diaphragms and other scraps. On the north side of the meter room, arranged in regular order, is the sink for washing meters, and the solder mould. The meters are washed in a sink 4 feet long and 3 feet deep, made of heavy galvanized iron with cock at bottom to drain it. The boiling vat has the same dimensions and is supplied with a steam coil and a set of gas burners underneath. The dimensions of painting and work bench are 6 by 3 feet and 14 by 3 feet, respectively. All benches are amply supplied with drawers.

This room gets its light from a combination skylight and ventilator, 6 by 12 feet built in center of roof. The odor rising from the meter room can best be drawn off by a ventilator located at the highest point. On the wall in front of the proving table are hung the necessary gauges and a reproduction of the prover scales, showing the error of a meter by a quick comparison of the two. The meter room is connected by a large door on the west side with what we might call the surplus stock room. This room obtains its light from 3 combination ventilators and skylights each 5 by 12 feet. The walls are taken up entirely with tiers of bins 3 feet square. It will be noticed that there is no door leading from the stock room into the hay loft. Great care has been taken in designing this building to keep stock out of reach of parties unauthorized to handle it.

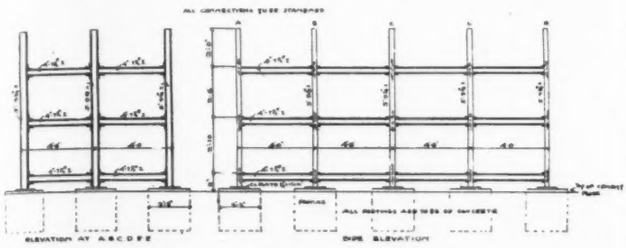
Barn.—The barn is a 2-story building equipped with 7 stalls on the west side of first floor. The main door opens on the north side; harness hooks, water trough and blanket lockers are on the east. One hay chute is sufficient for 2 stalls. Openings are made at bottoms of the chutes, and iron racks are arranged to keep the horses' heads from being caught while pulling out the hay. In the southeast corner are built the feed bins, the tops of which are flush with the second floor. The oat and corn bins holding 100 bushels each, are constructed in the form of hoppers so that the feed may be drawn out at the bottom. In this way the barn man operates from the lower floor, and clogged grain chutes are done away with. On the south end of the barn is a double door for the removal of refuse.

The barn has two ordinary sized windows in the north end and two of the same kind in the south. A small window, 18 inches square, is placed in the wall in front of every stall. In the north end, just west of the oat bin, is a stairway leading to the second floor. The second story is supplied with 3 doors, one at the north, one at the south, and one at the west side. These doors are constructed for convenience. It is often easier to put in hay and grain at one door than it is at another, owing to the location of the supply of hay already on hand. The roof is fitted with a 4 by 4-foot ventilator. The windows are five in number, two at the north, two at the south and one at the west side. The two windows in the northwest corner are principally for the purpose of giving light to the hostler's room, an ordinary rough sleeping apartment with only the very necessary conveniences. The walls of this room are finished with beaded ceiling.

Oil Room.—The oil room has brick walls and a cement floor. A further safeguard is furnished in a small roof ventillator 3 by 2 feet. Three conetop oil cans, holding 60 gallons each, with pump attachments, are used for the storage of thread oil, linseed oil and kerosene. Gasoline and wood alcohol are stored in underground tanks buried beneath the floor of the wagon shed. Pipes from these tanks lead up and connect with pumps in the oil house. On each side of the oil house is a track rail upon which runs a carriage. A barrel of oil is delivered from the wagon to this platform, and is then wheeled to a point directly above one of the tanks, where it drains itself, causing slight inconvenience and no loss of oil. The oil room door leading outside is used for but one purpose, that of admitting stock. The fore-

man and stock clerk are the only ones having entrance to this room. Close memorandum is kept of the liquids removed, a requisition being as necessary in this case as in any other.

Pipe House.—With a door in each end, the pipe house serves as a double convenience. Pipe is taken in at one end and out at the other. The pipe racks are so constructed that the different sizes are easily kept



Design for a Pipe Rack.

separate. This house will store about 11,533 feet of 1½-inch.; 12,845 feet 1¼-inch; 13,870 feet 1-inch; 24,624 feet of ¾-inch; 25,137 feet of ½-inch; 33,345 feet of ⅜-inch; besides a few lengths of the larger sizes kept on hand for special work. The pipe house is located at the east end of the shop so that it may be near the pipe machine. Sketch shows the pipe house door, the machine, and the door for sending out cut pipe, in somewhat regular alignment. This is one of the many arrangements that have been made for saving steps.

Wagon Shed.—The wagon shed, 69 by 23 feet, is merely a frame structure. The roof covered with composition material is supported by wooden posts. Sketch shows the roof arranged with exact height and incline to admit the most light possible into the buildings when shed doors are open.

It is not considered necessary to have a tightly constructed wagon shed. At night the first wagon in lines up at the east end, the next one alongside, and so on. After 6 o'clock P M. the barn man closes the sliding doors and locks them. The floor of the shed is made of cinders solidly packed. In connection with barn and wagon shed it seems best to describe the wagons and necessary equipment. The style of wagon used is the Studebaker, No. 1117, with box 8 feet by 45 inches by 10 inches; weight 650 pounds. On each side of the box the company name and wagon number appear on a brass sign, 8 by 32 inches. Under the rear end of the box hang three canvas bags for meters. This has been found the safest means of transporting them The additional equipment consists of a woollen horse blanket, a rubber blanket, and a heavy canvas stove cover. The last named article is simply a hood or case slipped over a stove for protection in rainy weather.

The only light vehicle is a Studebaker runabout, No. 977, with low box 27 by 66 by 4 inches; weight, 380 pounds. This buggy is used for special work, such as foreman's inspections, scattered meter readings, emergency complaints and special deliveries. In order to render service that is entirely satisfactory, it is necessary to maintain a conveyance of this kind.

Employees.—In every business where a number of men are employed special attention is given to quality of labor. It is the manager's business to see that he has a good foreman. It is the duty of the foreman to provide honest, skillful and loyal men to carry on the work. If a man is a drunkard, if he uses foul language, or if he cannot refrain from the use of tobacco during working hours, his name is never placed on the pay roll. In the matter of sobriety, honesty, profanity and cleanliness, the rules are as strict with a foreman as they are with a helper. In addition to the general qualifications mentioned above, there are others applicable to the different positions throughout the shop.

The foreman is selected for his qualities as a leader in every respect. His age and experience make him the most skillful; a thorough mechanic, familiar with every detail of the distribution department. He is a natural organizer with a clear idea of system, possessing strong executive ability, which enables him to follow his plans to the letter without antagonizing the subordinates.

The entire shop is at the foreman's disposal. He is responsible for condition of the building and grounds, as well as for the proper handling of orders. This responsibility means that work is to be done well and cheaply. The moment the manager receives notice of unsatisfactory service, or reports show that costs are running up, he seeks the foreman of the shop, and explanations are demanded. Further minute details in connection with the foreman's duties will be presented in that portion of the paper which takes up the handling of orders.

The fitters are practically of the same grade, because a helper never becomes a fitter until he is thoroughly competent to do the work in all branches. Every fitter is able to pipe a house, instal domestic and industrial fuel appliances and care for complaints. The complaint work itself requires much skill in the use of pressure gauges and the testing apparatus. The age of the youngest fitter is 25, that of the oldest, 35. When fitters are too young they are irresponsible, when too old they become slow. A fitter must have sufficient training to be able to handle the clerical work in connection with his orders. His judgment must be sound and his mind sufficiently clear to appreciate the importance of all rules governing his department.

Helpers are young men between the ages of 18 and 25. It is quite difficult to procure a helper who shows at the start that he will become a good fitter. Many have to be tried before one can be obtained who will properly fill the position. The helper assists the fitter in most of the work, inside and out. He does the cutting, threading and assembling of the pipe and fittings in the shop. While this is going on the fitter is outside sketching and taking measurements for new work, making reports, or otherwise attending to matters under his charge. The helper is exactly what his name implies, and is at the fitter's command on all occasions. The enumeration of his many duties would be of little value in this instance.

The machine man has charge of the pipe machine and does all of the cutting and threading. When the pipe is prepared it is turned over to the fitters' helpers, who attach fittings and assemble jobs ready for delivery. If every fitter had access to the machine the responsibility for damage could not be placed, the machine would be abused, and much argument would arise over the right to use it at different times.

The stock man possesses more than the average clerical ability and is very careful in accounting for stock. He is obliged to file all requisitions, check in and out all appliances, tools, and meters, and perform numerous other duties which will be brought out later in this description.

The meter inspectors do nothing but attend to readings. They are men over 20 years of age, selected for ability to read accurately and swiftly, and administer courteous treatment to the persons into whose houses they are obliged to go.

The arc lamp trimmers are the youngest employees in the department. Their duties are to clean and repair all arc lamps; seeing that the consumers are thoroughly satisfied with the service, and that the foreman is informed regarding mantles used, and repairs made.

In the meter department there is a foreman with several assistants, and a man to do the proving. The foreman has complete charge of this department. He fully understands the construction of gas meters and is responsible for testing, repairing and maintenance.

The barn man is perfectly familiar with the care of horses and is allowed to dictate how and when they shall be used. He keeps a record of the amount of feed consumed and reports to the foreman when new supplies are needed. He occupies a room on the second floor of the barn and is obliged to spend most of his time, including Sundays and holidays, in close proximity to the stable.

One of the most important persons connected with the operation of the shop is the order clerk. He numbers and records the job tickets and delivers them to the foreman. In addition to this he keeps in touch with the stubs held by the foreman for the purpose of locating the fitters. He possesses a fair amount of clerical ability and is a good writer and very tactful. In a busy season he comes in contact with many consumers and must necessarily possess a pleasing personality.

The fitters and helpers are supplied with uniforms and badges. The foreman as well as other shop men who occasionally work on the outside have badges, and are obliged to wear them on their coats where they can be plainly seen.

Twice each month the shop employees meet in the gas office and discuss matters relative to their work. This assembly is known as the "Fitters' Club," having its own president, secretary and advisory board. Questions are presented and discussed. By this means great benefit is derived, and the men, as well as the officers of the company, appreciate the advantages. When requested, the foreman states his views on any subject, but most of the discussion is carried on among the men themselves. Occasionally certain officials attend the meetings, and in this way the men are made to feel that their work carries with it a large amount of importance.

As long as the first cost of anything is its labor cost, the quality of labor should be seriously considered. In order to maintain this high grade, it is important that the men be continually informed of new and better ways in connection with their several positions. While assisting the employees in becoming more skillful, one should not lose

sight of the fact that the maintenance of good will is a large factor. In the operation of this shop everything is done to show the employees that they are on an equality with other members of the company. If good feeling exists throughout, the results are bound to show. One of the duties of the foreman is to see that this feeling does exist, and where he finds one man or some men pulling in the opposite direction, it is incumbent upon him to settle the matter then and there. Disorganizers can benefit neither themselves nor the company.

It is not possible to know too much about employees. Form No. 83 affords an excellent record. The name, address, and past history of a man generally show what may be expected. As soon as this card is filled out, a thorough investigation is made to ascertain whether or not the signer is going to be a benefit or a detriment. If an employee does anything commendable or anything deserving censure, the date of this occurrence with necessary comment is inscribed on the card. At the end of a certain period this record aids in deciding upon the man's qualifications for advancement.

Tools and Equipment.—The kind and number of tools with which a man is supplied depend upon the work he has to do. As all pipe cutting and threading are done in the shop, the men working on the outside are equipped with special tools. Nevertheless, the shop itself is supplied with cutting and threading tools to be used for emergencies, such as failure of pipe cutting machine, or work to be done where it cannot be brought to the shop. The first tools listed belong to a fitter engaged in fitting pipe already cut and threaded. In order that it may be clearly understood what style of tool or tools is intended, and without prejudice to other dealers, reference is made in most cases to some trade catalogue. Clow is abbreviated "C.," Crane, "Cr.," Wells & Nellegar, "W. N.," Williamson, "Wm.," and Hibbard, Spencer Bartlett, "H."

No.	Weight, Pounds.	Catalogue.	Page.
2 ¾-inch wood chisels made from hexagon steel.	3.00	W. N.	52
1 18-inch wall chisel	2.50	C.	399
1 ⅝ cold chisel	.58	W. N.	70
1 thin blade floor chisel 3 inches wide, made from hexagon steel; ¾-inch diameter; blade 4 inches long	2.00	C.	469
1 1¼-inch bit with long screw ship auger—wide twist	.54	W. N.	57
1 1¼-inch gasfitters' auger with long screw	3.00	C.	379
1 $\frac{3}{16}$-inch gimlet, handle feeler, bit 20 inches long with gimlet point	.25	W. N.	64
1 good ratchet brace, 8-inch sweep	3.00	W. N.	75
1 6-inch saw file	.12	W. N.	126
1 compass saw, 2 blades	1.00	W. N.	44
1 6-inch zigzag rule	.50	W. N.	108
1 25-inch metallic tape line	.50	W. N.	110
6 candles, 5 inches long (Standard Oil)	1.00		
1 ½ pint dope can; red lead and oil	1.50		
1 ½ pint can, aluminum bronze	1.00	W. N.	807
1 ½ pint malleable oil can	.75	C.	188
2 14 inch Stillson wrenches	6.00	W. N.	132
1 pair 10-inch B. & S. combinati n pliers	1.00	H.	145
1 test pump	4.50	C.	327
9 mercury cup and gauge	1.00	Wm.	D1161
1 perfect handle screwdriver; 6-inch blade	.60	W. N.	84
1 2-pound engineer hammer	2.00	W. N.	27
1 4-inch U-gauge and fittings	2.00	Wm.	D1162
1 8-inch square	.66	W. N.	103
1 reamer ⅜ inch, tapering to $\frac{3}{16}$ inch	.10		
1 kit of stove putty, cock grease, 8-penny nails, meter washers, and gasket rubber	1.50		
1 tool box, 20 inches by 6 inches by 6 inches	3.00		
Total weight	43.60 pounds.		

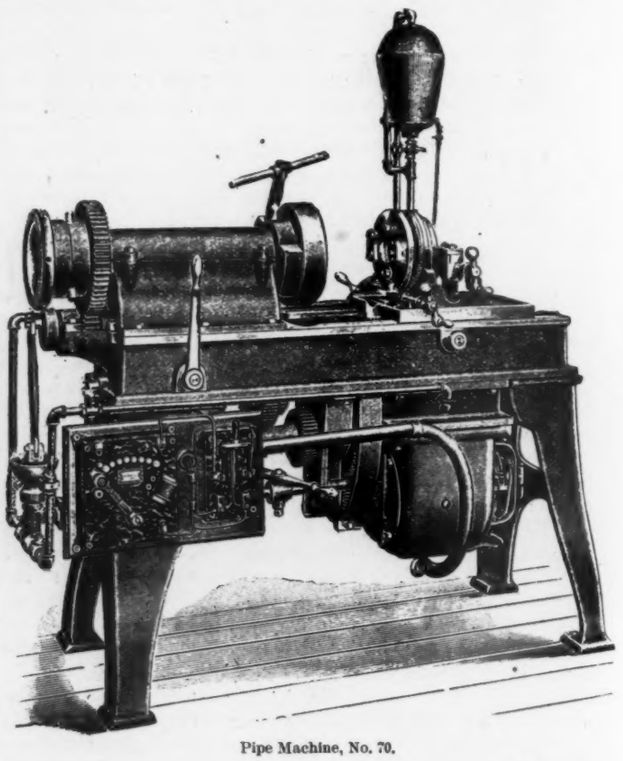
A glance at the total weight of this complete outfit shows that a fitter can easily carry it himself and, with the assistance of a helper who is usually with him, the task becomes very simple. The 2 men travel by street cars, or on foot when no wagon is available. If the kit includes stocks, dies, vises and heavy wrenches, no movement could be made without a wagon. With this system the fitter is never obliged to wait for a wagon, nor does it become necessary for a horse and wagon to remain idle several hours at a time. A box instead of a bag is used for tools on account of the much better protection afforded. This box is made of ¾-inch pine with a strap handle in each end.

Every fitter has a lock drawer in some one of the 5 benches in the fitters' room. Unless he has a safe place to leave his kit on an unfinished job, he is obliged to bring it to the shop. At night every wagon is stripped of its tools. Nothing of this nature is left lying outside where it might be stolen. The large tools, or those used for work inside, are kept in the fitters' room, and are never removed except for emergencies. These tools appear upon the list following:

No.	Catalogue.	Page.
1 Pipe machine No. 70		
1 iron pan of $\frac{1}{16}$-inch galvanized iron, 4 inches wide (used under pipe machine)		
1 pipe support for machine		
1 waste can for machine chips, etc. (equipped with oil drain)	C.	186
1 rubbish can for oily waste, etc	W. N.	1096
1 No. 3 Parker combination vise	C.	374
5 No. 1 Crane malleable vises	Cr.	302
2 ½-pint malleable oil cans	C.	188
5 pipe benches		

To explain the uses made of the small kit of tools used by the fitters seems unnecessary. A person familiar with the business can tell by glancing at any of the items what it is for. However, the list of tools on hand in the fitters' room needs some accompanying explanation.

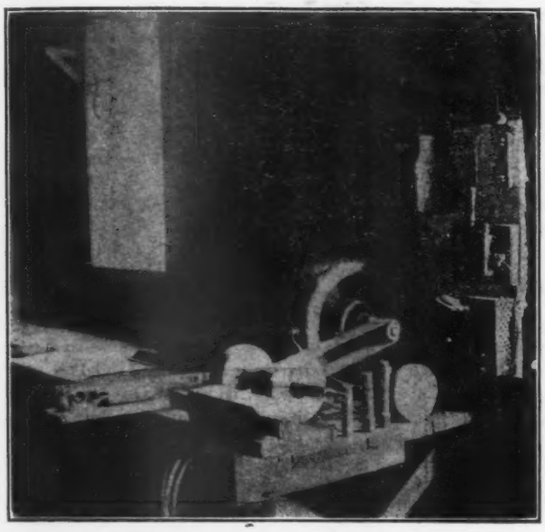
The pipe machine, No. 70, is shown in the following cut. It threads



Pipe Machine, No. 70.

pipe from ⅛ inch to 2 inches, and is equipped with a 2-horse power motor and oil pump attachment. This pipe machine is without doubt one of the best and most convenient of its kind. The dies are quick opening and adjustable. Each set of 4 pieces cuts 2 sizes of pipe. After pipe is threaded there is no backing off the dies as in the ordinary manner. All that is necessary is simply to open the dies and run the die head back. If the pipe is to be cut off, the dies will expand far enough to admit of passing through them the cutting-off knife. When dies require sharpening they can be quickly removed and ground on an ordinary grindstone. The die head is also provided with an adjustable stop pin which is very convenient when a large number of threads of the size are to be cut. Ordinarily every time a thread is cut the dies must be carefully re-set. With this adjustable stop, the dies are first set to the size to be threaded, then the adjustable stop moved and secured, which will only allow the cam to move to the point required to thread the proper size without the necessity of carefully re-setting for every thread that is to be cut. There are no loose bushings on the machine which, when required, cannot be found. It has on back end of spindle an adjustable self-centering chuck to center the pipe; also the same on die head to steady the pipe when being cut with the cutting-off knife. However, in connection with the machine it is necessary to use a support some distance away when a full length pipe is run into the machine. The cost of this machine complete is $350.

The style of pipe bench used in this shop is of special construction, the framework being made of 2-inch angle iron braced with ¼-inch rods. It is supplied with a 2-inch top, flush with the frame, also with two drawers and a 2 inch wooden shelf, 1 foot from the floor.



The following tools and materials are used in the meter room:

No.	Tools and Materials.	Catalogue.	Page
1	10-inch second cut file	W. N.	127
1	14-inch second cut file	W. N.	127
1	6-inch warding file	W. N.	127
1	5-light test meter		
1	pair straight tinner's snips, No. 8	W. N.	1102
1	pair circular tinner's snips, No. 8	W. N.	1102
1	meter connection machine		
4	pairs 5-pound solder coppers	W. N.	1115
2	soldering furnaces		
1	scrap solder mould—C. I. (small sticks $\frac{5}{16}$-in. square)		
1	No. 1 square vise	C.	375
1	piece railroad rail, 3 feet long		
1	12-inch hand bellows	W. N.	161
1	pressure pump with spring gauge and regulator		
1	bank of test light (98)		
1	"gasser" and gauge		
3	½-pint malleable oil cans	C	188
1	5-foot prover		
5	gallons black meter paint		
2	2½-inch flat brushes		

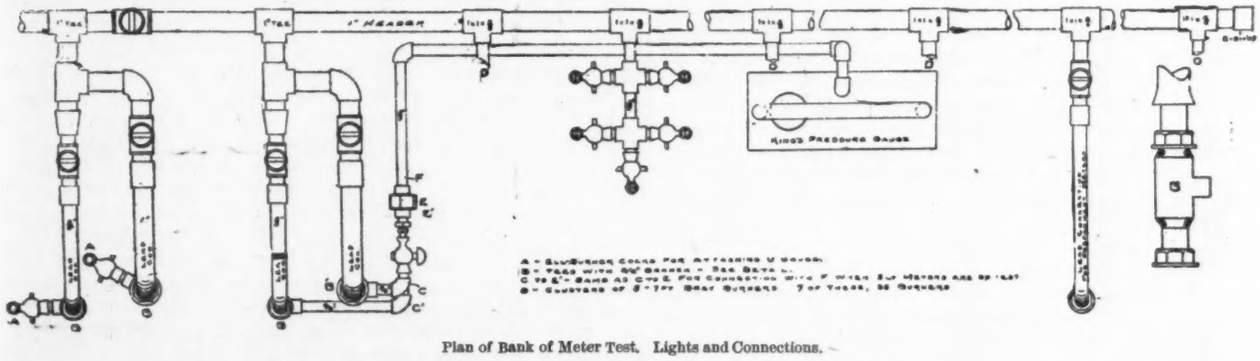
Among the tools used in the meter room the only ones needing to be mentioned are the meter connection machine and the bank of test lights, in the form of a rack which may be swung against the wall. An idea of the latter is given by the accompanying sketch. It is a device for testing meter capacities, and so arranged with cocks and gauges that a number of lights may be turned on at one time, and with the connections arranged so that various sizes of meters can be accommodated. These test lights are also of service in proving out the registration of prepayment meters.

The odor from meters under test is carried through the roof by a pipe in which there is a cock with indicator needle attached to the plug. The needle moves over a marked plate showing points at which the cock must be set for testing various sized meters. This device does away with the use of a number of caps differently sized. For the purpose of making a quick connection a meter swivel is arranged with a pair of weighted arms. In attaching the connection to the meter about to be tested, a single throw of the arms exerts momentum enough to make up the connection tight.

The meter connection machine is an apparatus for sawing lead pipe, spreading ends, choking, polishing and forcing on couplings. It is propelled by an electric motor and is a wonderful time saver. The finished connection has on one end an iron coupling, jammed and soldered, on the other end the regular nipple and meter swivel.

All tools not in daily use, and those held ready for replacements, are kept in the stock room, being taken out only at the foreman's request. A sufficient supply of extras and specials is listed below. They are mostly duplicates of those already mentioned. Although it may seem out of place to list so many tools, the idea is to show what is considered a necessary stock to keep the shop well supplied, thereby avoiding delay and expense.

No.	Tools and Materials.	Catalogue.	Page.
12	¼-inch chisels made from hexagon steel	W. N.	52
2	18-inch wall chisels	C.	399
6	⅜-inch cold chisels	W. N.	70
6	thin blade floor chisels 3 inches wide, made from hexagon steel, $\frac{7}{8}$ inch diameter, blade 4 inches long	C.	409
2	1¼-inch bits with long screw ship auger—wide twist	W. N.	57
2	1¼-inch gasfitters augers with long screw	C.	379
1	set of bits from ¼ to 1½-inch	W. N.	59
6	gimlet handle feeder bits, 20 ins. long, gimlet point	W. N.	64
2	good rachet braces, 8-inch sweep	W. N.	75
2	hand saws	W. N.	39
12	compass saw blades	W. N.	44
2	compass saw handles	W. N.	44
2	hacksaw frames	W. N.	42
12	hacksaw blades	W. N.	47
2	6-inch zigzag rules	W. N.	108
6	25-inch metallic tape lines	W. N.	110
4	½-pint metallic oil cans	C.	188
6	pairs 10-inch B. & S. combination pliers	H.	145
6	½-pint dope cans (tin with screw top)		
6	perfect handle screw drivers, 6-inch blade	W. N.	84
4	2-pound engineer hammers	W. N.	27
1	8-pound sledge	W. N.	29
2	nail hammers	W. N.	19
1	hatchet	W. N.	11
1	axe	W. N.	8
3	8-inch squares	W. N.	103
1	crate opener	W. N.	24
1	nail puller	W. N.	154
1	12-inch F. B. file	W. N.	126
4	¼-inch round B. files	W. N.	126
6	6-inch saw files	W. N.	126
1	10-inch half-round B. file	W. N.	127
1	10-inch flat B. file	W. N.	127
1	14-inch flat B. file	W. N.	127
2	10-inch second cut files	W. N.	127
2	14-inch second cut files	W. N.	127
2	6-inch warding files	W. N.	127
1	½-inch solid punch	W. N.	70



Plan of Bank of Meter Test. Lights and Connections.

No.	Tools and Materials.	Catalogue.	Page.
1	½-inch solid punch	W. N.	70
2	⅝-inch center punches	H.	141
2	½-inch punches	W. N.	1102
2	¼-inch punches	W. N.	1102
3	sets of Nye solid dies, ⅛ inch to 2 inch		
2	extra ⅛-inch above		
2	sets ⅛-inch above		
3	No. 1 solid stocks with adjustable followers		
3	No. 2 solid stocks with adjustable followers		
1	No. 1 Climax ratchet stock	C.	363
1	No. 2 Climax ratchet stock	C.	363
1	No. 1 Parker combination vise (for fixing work)	C.	374
1	Crane malleable vise	Cr.	302
6	10-inch Stillson wrenches	W. N.	132
6	14-inch Stillson wrenches	W. N.	132
4	18-inch Stillson wrenches	W. N.	132

No.	Tools and Materials.	Catalogue.	Page.
4	24-inch Stillson wrenches	W. N.	132
1	6-inch Coe monkey wrench	W. N.	131
1	8-inch Coe monkey wrench	W. N.	131
1	10-inch Coe monkey wrench	W. N.	131
1	15-inch Coe monkey wrench	W. N.	131
1	No. 1 Saunders pipe cutter	C.	365
1	No. 2 Saunders pipe cutter	C.	365
2	sets of parts for above sizes	C.	365
2	No. 1 Barnes pipe cutters	C.	365
2	No. 2 Barnes pipe cutters	C.	365
2	sets of parts for above sizes	C.	365
1	small drill press	W. N.	161
1	set drills above	W. N.	63
1	breast drill	W. N.	79
1	set drills for above	W. N.	63
1	wheel frame equipped with 2 emery wheels; 1 fine and 1 coarse		
12	round brushes, 1 inch diameter, for testing joints		
12	round brushes, ½ inch diameter, for dope		
6	2½-inch flat paint brushes		
1	set of jeweler's reamers	Wm.	D1157
1	¼-inch taper reamer	W. N.	64
1	7/16-inch taper reamer	W. N.	64
1	⅜-inch taper reamer	W. N.	64
1	½-inch taper reamer	W. N.	64
1	12-inch hand bellows	W. N.	161
1	set of thermometers (4)		
2	No. 19 Bristol portable gauges		
2	test pumps	C.	327
2	mercury cups and gauges	Wm.	D1161
3	No. 4 U-gauges and fittings	Wm.	D1162
5	gas main clearing pumps	C.	327
1	set No. 10 platform scales	W. N.	665
12	hammer handles	W. N.	173
3	Yale locks	W. N.	354
1	yard 1/16-inch gasket rubber		
1	keg 8-penny wire nails		
4	boxes crayons (4 gross)	W. N.	592
120	candles 5-inch long (Standard Oil)		
1	gallon aluminum bronzing liquid	W. N.	807
5	pounds stove putty		
¼	pound cock grease		
12	bars common soap		
12	boxes gold dust		
10	gallons ready mixed dope (red and white lead and oil)		
1	pound fixture cement		
1	gallon black meter paint		
1	jug mercury (5 pounds)		

The Handling of Orders.—The best manner in which to describe the method of filling orders is to take one of every kind and follow it through. Let us begin with an order to pipe a house. The signed contract form No. 15 reaches the order clerk, showing name of person for whom, and the place at which, the work is to be done. It states the number of rooms, the different ceiling heights, the style of fixtures and the exact room in which every one is to be placed. In addition to this the contract shows the charge and conditions governing payment. The solicitor writes his directions as full as possible so that the fitter who does the work, and the bookkeeper who enters the charge, may become thoroughly familiar with the original agreement. The words of this contract are copied verbatim on the job ticket, form No. 28, of which a copy is kept in a bound book by the use of a carbon sheet. The clerk delivers job ticket to the foreman marking upon the duplicate the date and time of day when this is done. In connection with the job book is an index which gives the name and address on the contract, the date it passed the new business clerk, the date it passed the credit clerk and the number of the job ticket. When information is sought relative to a certain contract the number of the ticket can be easily located. Once this is done the inquiry is satisfied either by the clerk himself or by the foreman through the use of the telephone.

After filling in the stub at the end of the ticket the foreman removes it and places it in a box bearing the name of the fitter to whom he intends to assign the work. The ticket is then dropped into the fitter's box above the fitter's desk. The fitter, as soon as he can do so, proceeds to the given address and makes the necessary sketches and measurements using a common blank book for the purpose.

Some strong arguments have been presented to prove that the system of bringing measurements into the shop is not economical. However, it must be understood that every fitter is assigned to a district, that these measuremants are taken when most convenient, either while the helper is starting or finishing a job in the near vicinity, or while he is in the shop assembling the pipe for a previous order. It would be unwise to go to a house, take measurements, return directly to the shop, prepare the pipe and then proceed again to the same place to complete the installation. The conditions are often such that it is possible for the fitter and helper to work separately. This is where the close cooperation of foreman, fitter and helper produces results. Returning to the shop with the full measurements the fitter places the material needed onto the job ticket. At the same time, by using a carbon sheet, he transfers these items to form No. 89.

Requisition for Material.—The requisition is submitted to the foreman for his O. K. This being affixed, the requisition and sketch are given over to the machine man who proceeds at once to the stock room and receives the necessary pipe and fittings. The fixtures are not received by the helper until he is ready to leave the shop for the purp se of installing the job. It will be noticed on the requisit on that the pipe with its fittings and appliances, including fixtures, are signed for separately. As above stated this is necessary, because all of the material is not delivered by the stock clerk at the same time.

When everything is in readiness, the fitter informs the foreman, and an order is given to a driver to deliver the material. For this purpose form No 888, known as driver's order, is used. On the job ticket, which is yet in the fitter's possession, memorandum is made relative to this delivery. The fitter and helper may ride on the wagon to the work or may remain in the shop for another purpose. It is often the case that material is delivered to a house 24 hours before preparations are complete for its installation. When the work is entirely finished, the fitter requests the owner of the house or some member of the household to sign the job ticket, showing that the order has been satisfactorily completed. If this ticket is not properly signed the foreman does not turn it in to the office until he is convinced that there is a good reason for its not bearing a signature.

As soon as the work is completed the job ticket is given back to the foreman. If, through shortage of stock of any kind, the job is not complete, notation is made upon the ticket in the space provided for this purpose. When the bookkeeper has the work charged he returns it to the order clerk who makes out a new job ticket for the uncompleted work. On this ticket is stamped, "This completes job No. ——." Naturally the foreman is obliged to hold it until the necessary stock has been received in the stock room. [Long continued applause.]

Discussion.

The President—The paper just read gives every evidence of the great care and the enormous amount of work in its preparation. I will ask Mr. Hartman to start the discussion on the subject.

Mr. W. E. Hartman—The paper, which certainly shows a large amount of work, is certainly a valuable contribution to the Illinois Gas Association as a paper of reference in shop work. I do not believe I can add anything further to the subject than that stated in the paper.

The Secretary—This is the only paper to my knowledge that has ever gone into that subject and I think a very valuable piece of work has been done in furnishing a reference paper of this kind. Its value is great and an enormous amount of work has been done in preparing it. I think every time you go to it you will get something new or useful out of it. One question that occurs to me is with reference to the tickets for keeping track of the meter readings so 100 feet more or less would not be dropped off. Mr. Strohn says on page 70: "When a meter is brought in it is delivered to the stock man at once. He receipts for it by placing his initials on the 'Out Slip,' and attaches 'Tag, Form No. 81' with correct index. The use of this tag prevents the loss or gain of 100 feet, an occurrence quite common in the setting or removal of meters." I would like to ask him what difference the dropping or gaining of 100 feet would make. If it is at any time necessary to check up the registration of the meter it seems to me the first and final index on the record card will give the information you want as to the gas passed through it, so I fail to see what object is gained by checking that one item. Another remark I want to make is about the number of fo ms submitted. So far as the operations of the shop are concerned, we have operated our shop in Peoria on practically the same lines for 7 years, from the time the Peoria Gas and Electric Company, formerly the Peoples Gas and Electric Company, organized its shop, and we have found so many forms very difficult to keep up. I endeavored to work along the lines on which Mr. Strohn has gotton up his paper, by the use of forms. We had an enormous number of forms in our work. I found this difficulty. I ran my expenses up and I got information which, while valuable, cost a lot of money and never was of any use practically. I have about come to the conclusion to use as few forms as possible. For setting meter orders, leak orders, sale orders and things like that I have about worked out one common form that will serve all the purposes of 15 or 20 different forms. I know of two different companies which, in the past 6 or 7 months, have worked out a form of this kind, have installed it and are getting good results from its use.

Where you have so many forms in a shop of the ordinary type your foreman is kept constantly busy checking up forms and making out reports and cannot give the time that he should to his work. That was the trouble I had while I ran a shop for a number of years. My foreman was constantly coming to me claiming I was making a clerk of him, that he could not get time to follow up his men. That is the difficulty I ran up against in handling a lot of forms, and every time we installed a new department we went over the work very carefully to determine what we wanted to handle, how we wanted to handle it, what reports we wanted and got them out. Then when we wanted to fill out a report we often would fall down; when we wanted information we had to help the clerks to get the information up. It required almost as much work to keep our reports in shape as it did to do the work. That is the criticism I would make on the number of forms submitted. Mr. Strohn is entitled to a great deal of credit for the work he has done in getting out the forms. He gives an ideal method of handling shop work, but when it comes to putting it in practice I am afraid, so far as the average company is concerned, the cost would make it prohibitive.

Mr. W. R. Rhoades—I would like to call attention to the age of the employees. The age of the youngest fitter is placed at 25 and the oldest at 35. Why is the age limit placed as low as 35 years? It seems to me that a fitter is as able to work at the age of 35 as at any other time. He ought to be about in his prime.

Mr. Quackenbush—This paper rather takes my breath away. I understood when the paper was first read it was an actual shop, but I understand now it is an ideal shop not in practical use.

Mr. C. B. Strohn—It is an ideal shop, every phase of which is not in practical use.

Mr. Quackenbush—I think if that system were put in practical use you would come near having an ideal shop; at the same time I agree with Mr. Robb in believing you have forms there that are going to cost more to look after than the information you will get out of them is worth. I have tried several times and found personally it hardly pays to spend much money looking after the recording of small things. The value of each fitting is so small that the discrepancy, if you use any care at all, at the end of the year is so small that it is not sufficient to spend $40 or $50 a month to watch it. I keep track of the pipe; the small fittings I do not keep track of particularly.

Mr. H. L. Rice—The way the question of a number of forms and the keeping of them up appeals to me is this: The city in which this ideal shop shall be located is, I suppose, one of about 60,000 inhabitants. Such a city under an energetic new business campaign would possibly add to it 2,000 or 3,000 gas ranges annually, and perhaps for a considerable time an equal number of houses piped. You would have a very large street department, and it must be borne in mind that in the actual work of checking stock this additional street department is not taken into consideration at all. Nevertheless with the same stock clerk, the expense will be divided with the street department If we add 2,000 or 3,000 stoves and 2,000 or 3,000 houses annually, a large number of services and a considerable mileage of mains would have to be laid. There would be a saving of a small amount on each gas range, house, or service, and on each 100 feet of main, in the efficiency of the workmen, that will pay the cost of the clerical help in this shop many times over. I would like to ask Mr. Robb whether he provided his foreman with a clerk, or was absolutely confident he could not afford a clerk to do this clerical work in the shop? I notice the ideal shop mentioned in the paper is provided with a clerk, and in conversation with Mr. Strohn I understand it is his idea, in case of the illness of the foreman, the clerk should be able to perform the duties of the foreman for such short time as the foreman should be away, which is another advantage of having an extra man.

The Secretary—In handling our work we did not provide the foreman with a clerk, and I think that was an oversight on our part. I believe we would have saved money by doing it, because the foreman then would have more time to follow up his men and give more attention to matters which would have been better served by having his attention. We would have saved more money by allowing him time to follow up the work of his men than the salary of a clerk to take care of his clerical work would have amounted to.

Mr. H. G. Stillson—I feel there is a good deal to be said in favor of having a system of forms such as those noted in the paper. In our Company we have a great many of these forms and they are taken up and go through to the general officers, and they are able to follow more minutely the work done in the local shop, and along with the district manager are able to give him considerable assistance in handling the shop. That is an advantage which an ordinary shop would not require. I believe with Mr. Robb and Mr. Rice that a foreman in a city the size of Peoria should have a clerk, and that this clerk should be a man who perhaps should be known as the assistant foreman, and should have power to direct the men in case the foreman was out and otherwise assist him in making up his records and handling his men.

Mr. Quackenbush—Does this foreman ever go out of the shop, if he is supposed simply to look after the business in the shop? I gather from the paper that the man is a shop foreman, not a distribution one. I think with that shop to look after he would not have time to get out very often, even if he had a clerk, as he would have all these orders to look after, etc.

Mr. H. L. Rice—On one point in the paper, which refers to what advantage there is in cutting threads, assembling the pipe, etc., in the shop instead of on the job, I would like to have the views of some of the gentlemen present, as it is possibly somewhat of a departure from the ordinary method.

The Secretary—Regarding the cutting of the threads on the pipe in the shop, I will say that ever since we have had a shop in Peoria it has been our practice to cut our pipe in the shop, never on the job. I talked with the foreman only a week ago about it, and he told me about one of his fitters who had averaged a job of house piping complete every 15 hours for something like 10 or 15 days. The work he was engaged on then was on no special type of house, but on some cottages and 2 story houses he was turning out a job complete every 15 hours, which is a pretty good record I think. With us a man measures a number of jobs on the ground, then goes to the shop, cuts the pipe out, labels it and the wagon delivers it. The men can then put it in and make better time than were you to send the pipe, vise, tools and fittings to the place and let the men do the work on the job. While it seems difficult at first (we had some trouble in breaking the men in to begin with) to take the measure for the house on the ground and do the cutting of the pipe at the shop, still after training a man a week or two in that line of work he becomes an expert and turns out the work faster than where they take the pipe and fittings and do the cutting on the job.

The President—If there are no further remarks I will ask Mr. Strohn to close the discussion.

Mr. Strohn—I will first answer Mr. Robb's question regarding the form of the tag we attach to the meter so it will not lose or gain 100 feet. In the record that I mentioned, in which we require the history of the meter to be recorded from the time it comes into our possession, just what it read when set and what it reads when taken out and set again as many times as it may be moved. We have a set rule for reading meters. For instance, we insist they always take the smaller number. If the pointer is between two numbers we always insist the reader take the smaller number. If that is not done the stock man or someone will catch that as it comes in. So the record of the meter comes true—we don't want the readings to lap over when we put them on our record, because we want to say to people who complain, you take this meter of yours and we will trace its history from the time it came into our possession, and if you can show us where one reading laps over another we will make an adjustment according to your suggestion. That is why we take this precaution to see the meter is set right, the same as it was when it came out, and it is a good thing to have this tag attached to the meter because it is quite common for men to read a meter hastily, and if it has this tag on it is a sort of a reminder and less errors are made in meter readings. As to the question with regard to 25 years of age being the ideal age for a fitter. I have found in handling fitters there is a certain age where a man seems to be too young, and I think a man under 25 is too young to go at it. Of course, there are exceptions, but it has been my experience that under that age they are too young, they don't take the proper interest in the work and do not make the impression upon the people for whom they do work. I have had people come into my office and complain about little defects. Among other things they say, "You sent a boy to do the work any way; why don't you send a man?" I think the age of 25 would be about the ideal age for a fitter.

Mr. W. R Rhoades—I spoke about your cutting them off at the age of 35. Why not make it 40 or 45 years of age?

Mr. Strohn—I can only say that when they become too old they become slow. I think any man between the ages of 25 and 35 does his best work; that is, special work with the hands. Mr. Quackenbush asked why it was necessary to take into account all the small fittings. Maybe I misunderstood his question, but I will say on every job ticket we record the exact number of fittings of every size. You must know absolutely the cost of the job. If you do not get it down to the finest point it is unreliable, and it is as easy to put down the actual number of fittings you use as it is to guess at it.

Mr. Quackenbush—I referred to spending so much money in checking fittings in and out of the shop or store room.

Mr. Strohn—I think all will agree it is proper to record your mantles, lamps, glassware, etc., which come in and goes out. If a person

wanted to take fittings from you he could if no record is kept of them. The question then is whether it is cheaper to let someone steal fittings from you or keep a record of them. I believe if you are going to keep track of anything you might as well keep track of everything. I believe the next question related to whether or not the number of forms gave the foreman too much to do. The foreman not only has charge of the shop and his orders but also the work on the outside. These forms, of which you see so many on the walls of the room, are in daily use—I do not say every one, but almost all would be. In our district we are obliged to use these forms because we are called upon by the heads of the different departments to furnish reports to show we are recording everything, and it has never occurred to me we had so many forms until I assembled them all here. I would like to ask anyone if he ever counted up his forms; if he did he would be as surprised as I was. We do not find it causes any large amount of labor. The foreman doesn't have much to do. A clerk is provided to take the daily time tickets. For instance, when a fitter makes out his own time card he throws it on the foreman's desk, who looks over it, "O. K.'s" it and passing it to the clerk, then the clerk takes all this information from the daily time card and the different forms I have described, so we are not overloading the foreman with work. Another thing in favor of these forms is they are reminders. If a man knows what he is to do he can do it. It is like a piece of string tied around the finger, you have something to remind you of what you are to do and you will not forget it.

Mr. Persons—This paper is very valuable to us all, and I move we give a vote of thanks to its writer, Mr. Strohn. [Carried.]

On motion the convention adjourned until 10 A.M., March 21.

(To be Continued.)

An Analysis of the Causes of Candle Power Diminution in Frosted Lamps.

By Mr. Preston S. Millar.

In the *Electrical World* of March 17, 1906, was published an article by Messrs. Cravath and Lansingh, reporting upon tests of the "useful" or "80 per cent." life of frosted incandescent electric lamps. The results indicated the rate of candle power diminution to be about twice as rapid as that of unfrosted lamps of the same type. The article raised a number of interesting questions and created considerable discussion both in this country and abroad. Following up the investigation, the writer has collected some data bearing upon the subject and presents them in the form of an analysis of the cause of the candle power deterioration, endeavoring to locate, with at least approximate accuracy, the extent to which the various factors contribute toward the net results. All data are obtained from tests of 16-candle power, 3.1-watt carbon filament lamps tested at the Electrical Testing Laboratories. These tests include investigations of the following causes of candle power deterioration:

1. Loss in candle power due to increasing carbon deposit upon the inner surface of unfrosted lamp bulbs.

2. *Increased* loss in candle power due to the same carbon deposit upon the inner surface of *frosted* bulbs.

3. Loss in candle power due to dust and dirt upon the frosted surface.

The data on candle power loss due to absorption by carbon deposit and to filament change in unfrosted lamps will be applied to frosted lamps. Warrant for this course lies in the fact that the resistance of the filament in unfrosted lamps varies throughout life substantially as does the resistance of the filament in frosted lamps. There is every reason to believe, therefore, that the filament change and resultant effects as determined in clear lamps may be applied without error in consideration of frosted lamp data.

Loss in Candle Power Due to Blackening of Unfrosted Lamps.—The following lamps were selected for this test: Seven new lamps, 5 lamps whose candle power had deteriorated 12 per cent. during 324 hours of burning, and 12 lamps whose candle power had deteriorated 20 per cent. during 470 hours of burning.

The bulbs of these 24 lamps were removed from their mountings. A tubular lamp of suitable dimensions was procured. Determinations of mean horizontal candle power were made with the tubular lamp alone and again when the tubular lamp was placed inside of each of the bulbs in turn. From the results may be determined the loss of light due to the absorption of the carbon deposit and the glass wall. By a comparison of the results obtained from the three groups of lamp bulbs the loss due to increased density of the carbon deposit may be determined.

This comparison is valid becaused later determinations made by cleaning both the new and old lamp bulbs demonstrated that the absorption of light by the glass alone was substantially constant when considering the mean of the values for the three groups of lamps.

An alternative method which suggests itself is that of comparing the old lamp bulbs before and after removing the deposit of carbon. Results obtained in this manner are likely to lead to improper conclusions as to the increased absorption due to increasing deposit throughout life, because the bulb of the normal new lamp, which must be made the basis of comparison, already bears a slight coating of carbon deposited during the manufacturing processes. A comparison made in this way would, therefore, lead to an exaggerated estimate of the deterioration in candle power ascribable to increasing density of deposit.

The investigation was confined to the horizontal plane for the reason that it is general practice to determine deterioration in candle power by measurements of mean horizontal candle power. We are, therefore, concerned more with the loss of light in the horizontal plane about the lamp than we are with the actual loss of light in all directions, as would be determined by measurements of mean spherical candle power.

Average results obtained from these three groups of lamps by the method outlined are as follows:

Absorption of glass and deposit of new lamps	5.0 per cent.
" " " " " "88 per cent. lamps	11.7 "
" " " " " "80 " "	15.7 "
Loss due to increased absorption at 324 hours	6 7 "
" " " " " "470 "	10.7 "

Deterioration in Candle Power of Clear Bulb Lamps Due to Changes in the Filament.—It having been shown that in certain instances the deterioration in candle power due to increasing density of carbon deposit upon the inner surface of the globe amounted to 6.7 per cent. at 324 hours, and to 10.7 per cent. at 470 hours, it is assumed that all other deterioration not so explained is due to changes in the filament. The extent of such effects would then be 5.8 per cent. at 324 hours and 10.5 per cent. at 470 hours. These values are obtained by eliminating from a standard life test performance curve the effects shown to have been due to increasing absorption by the carbon deposit.

Loss in Candle Power Due to Increased Light Absorption by Carbon Deposit when the Bulb is Frosted.—The following method was adopted for determining this factor: Sixteen new clear lamps, 6 clear lamps whose candle power had deteriorated 12 per cent. in 324 hours of burning, and 10 clear lamps whose candle power had deteriorated 20 per cent. in 470 hours of burning, were selected. The mean spherical candle power of each was determined. They were then acid frosted by the Sawyer-Man Electric Company, all under similar conditions, the lamps of each group being placed at one time in the same frosting rack, and the entire group being dipped as a unit. The results indicate the increased loss of light occasioned by the frosting upon the bulb of the two groups of lamps which had been burned for considerable periods.

Average mean spherical c.p. of 16 new lamps—clear	13.4	
frosted	12.6	
" " " 6 "88 per cent. lamps"—clear	11.6	
frosted	9.95	
" " " 10 "80 per cent. lamps"—clear	10.6	
frosted	8.6	
Loss of light occasioned by frosting—new lamps	6.0	per cent.
"88 per cent. lamps" (534 hours)	14.3	"
"80 per cent. lamps" (470 hours)	18.9	"

These data indicate a loss of 8.3 per cent. at 324 hours and a loss of 12.9 per cent. at 470 hours, due undoubtedly to the action of the increasingly dense carbon deposit in absorbing a gradually increasing proportion of the light which the frosted surface reflects and diffuses internally.

Loss in Candle Power Due to Dust on the Frosted Surface.—The only test of frosted lamps whose results are at the writer's disposal were made under conditions which made the soiling of the surface a factor to be considered. Consequently the lamp bulbs were not cleaned throughout the tests. Two tests of this kind may be referred to. In the first, 20 frosted lamps were burned for 290 hours; in the second, 7 frosted lamps were burned for 336 hours. The loss of light due to the dust upon the frosted surfaces is shown in the following statements:

First Group.

Average mean spherical candle power at end of test	9.83	
after washing	10.74	
Loss due to dust	6.7	per cent.

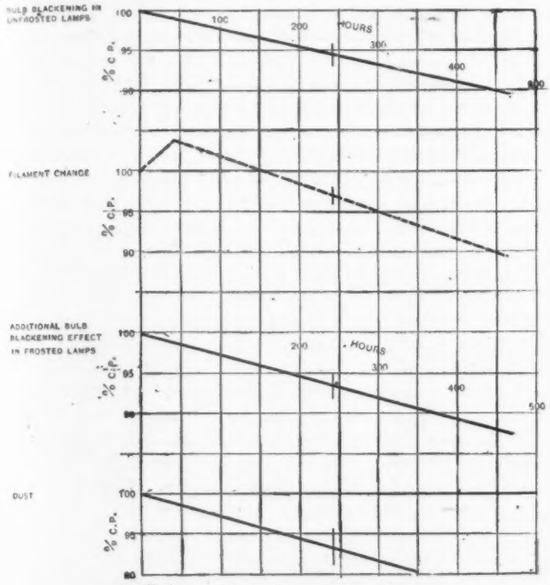
Second Group.

Average mean spherical candle power at end of test	8.4	
after washing	9.5	
Loss due to dust	10.5	per cent.

It will be understood, of course, that this factor depends largely upon local conditions and varies with the length of time during which the lamp is exposed rather than with the hours burned. As in the case of both tests referred to, the relation between the time the lamp is exposed and the length of time burned is practically constant, the latter is used.

Figures showing loss of light due to dust are to be understood as applying to the particular cases under consideration only.

Application.—The accompanying illustration shows the points determined by test and shows curves which the writer has ventured to draw in order to apply the results of the investigation to a test case. In accordance with the best information available, the "useful" or "80 per cent." life (20 per cent. candle power diminution from initial candle power after frosting) of frosted lamps, when the bulbs are not cleaned during the test, is 240 hours. From the diagram, we derive the following factors as representative of conditions at 240 hours:



Candle Power Diminution in Frosted Lamps.

	Per Cent.
Candle power diminution due to change in filament	2.9
" " " " " bulb blackening in unfrosted lamps	5.3
" " " " " additional absorption by deposit to which frosting subjects a portion of the light	6.5
" " " " " dust on surface of frosting	6.8

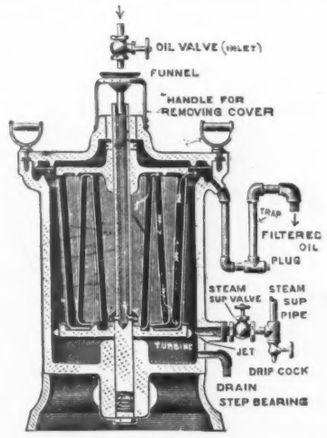
That is to say, change in the filament is responsible for a decrease to 97.1 per cent. of initial candle power; the primary bulb blackening effect as in clear lamps further reduces the candle power to 92 per cent. of initial; the additional absorption to which the frosting subjects a portion of the light still further reduces the candle power to 86.9 per cent. of the initial value, and the dust factor occasions a final reduction to 80.1 per cent. of initial.

These data are dirived from independent tests made at intervals throughout a period of 18 months. Applied in this rather crude manner, they cover the situation so thoroughly that no doubt remains as to the validity of the explanation which they offer for the relatively rapid decline in candle power of frosted bulb lamps.

Since writing the above, Dr. E. P. Hyde has published preliminary results of experiments conducted at the Bureau of Standards. It is interesting to note that Dr. Hyde's investigation along the same lines as part of the investigation reported above, yielded results of a similar character, differing only in degree from those obtained by the writer.

The Turbine Centrifugal Oil Filter.

Iron Age says that a machine for cleaning oil, which is of a novel principle in its construction and operation, is the turbine centrifugal oil filter, manufactured by the Oil and Waste Saving Machine Company. It is driven by a single wheel steam turbine mounted near the lower end of its vertical shaft, which requires no attention beyond the turning on and off of the steam to start and stop it. The illustration shows a section of the machine with the parts and their purposes identified so clearly that little description is necessary. The oil is introduced into the filter through the hollow shaft of the turbine, while the machine is running, and is sprayed through holes at the bottom of the hollow part of the shaft upon the filtering cloth and filter paper, which are supported by conical drums revolved by the turbine. The centrifugal force carries the oil through the filtering materials and over the surface of the drums in sequence, from the inside to the outside, until it escapes through the outlet near the top.



The oil continually passes through clean filtering material for the reason that as soon as the first part of the filtering material encountered becomes dirty or dammed up, the oil takes a new course through the nearest clean part. This is a great advantage over former filtering processes, in which all of the filtering material is exposed to the dirt in the oil at once, and soon becomes so fouled as to greatly retard the filtering or allow the dirt to be carried through with the oil.

The filter can be taken apart quickly by loosening the handles at the top and removing the cover, and the filtering materials can be cleaned and used over again, with the exception of the paper through which the oil passes, which is so inexpensive that it is cheaper to renew it.

SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, April 9th, 1907.

Water in Tar.—Coalite.—Gas for Balloons.—Coal in Kent.

One of the numerous problems that from time to time claim the attention of gas engineers, is that of separating water from tar. The question originates with the distillers, who buy large quantities for fractional distillation, and complaints of a high percentage of water appear to have some connection with low prices for tar. Anyway, I have noticed that they always acquire greater prominence during a period of low tar values. An instance has been quoted in England, where the distiller, after accepting tar without question for some years, began to talk of an allowance of as much as 25 per cent. for water, and the subject has also been discussed at a Gas Managers' Association in Germany. The statements made by the speakers are remarkable for their strange and contradictory nature. For example, one speaker said that higher percentages of water in tar, even up to 20 per cent., had come in with higher heats. But the usual experience is that as the heat is increased the tar becomes denser and more pitchlike, and therefore the more readily separable from water. Another speaker had found the tar to vary from the same retorts, being sometimes quite thick and sometimes wet. In a third instance, after making 6 per cent. of tar regularly for some years, trouble suddenly arose from the presence of a large quantity of water, 8 to 12 per cent. free and 10 to 14 per cent. combined. But the higher the proportion of water the greater the proportion of oil in the tar. The same uncertainty appeared to obtain as regards the methods followed for separation. One speaker said a centrifugal machine was a success and another had found it a failure. He then tried blowing compressed air through the mixture and was thus able to reduce the water from over 25 per cent. down to 8.

The separation of water from tar is largely a matter of settlement by gravity. The usual experience is that water gas tar gives more trouble in this respect, and the explanation may be that the tar is lighter and more nearly approaching the specific gravity of water. The objection to the centrifugal machine is that its action is dependent upon gravity, and that it does not differentiate between water and oils of about the same specific gravity. The settlement appears to be facilitated by moderate warmth, as it will usually be found that the light tar from the condensers, deposited at a comparatively low temperature, is richer in water than that from foul main. Blowing air through the mixture would probably be attended with loss of ammonia, naphtha and other volatile matter. One point that the buyers seem to overlook is that the so-called "water" is not pure, but is a fairly strong ammoniacal liquor, and as such has a value equal to at least half the price of tar.

At present the best known means of avoiding trouble with the tar distillers appears to be the use of a sufficiently large storage and settling tank, from which the tar for sale is drawn by a pipe extending to the bottom, and to take care to retain not less than 3 feet depth of tar in the tank.

In the present state of the tar market, this residual—or should we say, waste product—is essentially matter in the wrong place. All sorts of suggestions have been made from time to time, and more than once a successful application for it has apparently shown well above the commercial horizon. But notwithstanding the brilliant discoveries of Perkin and others in regard to the dyes and other valuable products that can be extracted from it, the claims that it is worth twice as much as coke as a fuel, and superior to cannel as a gas producing or enriching material, and so on, it still remains a drug on the market, and gas companies get no more for it than they did 60 years ago.

In this position makers of tar are awaiting the coming of summer weather, in the hope that the experiments on the use of tar for laying the dust on our main roads and abating if not altogether avoiding the nuisance caused by the large and increasing motor traffic, which in many instances were carried to a successful issue last year, will be extended and repeated. Complaints of the dust raised by a rapidly traveling motor are if possible more violent than ever. Pedestrians and cyclists are agreed against the common enemy in respect to it. They do not like the risk of being run down, or the odor of the petroleum vapors that are diffused in considerable quantity from the back of the vehicle, but still less do they approve of being smothered in a cloud of dust. We were favored with splendid weather during the Easter holiday, and cyclists who took advantage of it for a long run complain bitterly of the annoyance which frequently necessitated a stop at the side of the road till the cloud had subsided.

There seems to be a fair consensus of opinion amongst road surveyors and others interested in the question that tar properly applied may be an efficient medium for forming a dustless surface, but it is important to remember that the presence of an appreciable percentage of water is certain to be fatal to success. Tar applied for this purpose should be carefully examined and leveled for a sufficient time before use to eliminate water and light oils. The extended use of tar in this direction will also be advantageous as advertising the use of tar asphalt for sidewalks, stable yards, playgrounds, etc.

Public opinion, technical and otherwise, has been somewhat interested during the last few months by somewhat obscure and mysterious deliverances respecting a new material to which the name of "Coalite" has been given. It is a product from coal, and the details of the process are not yet made public, but so far it appears clear that an attempt is made to utilize coal from a new standpoint. The proprietors of the process may have sound reasons for putting the cart before the horse by advertising the properties of the finished product while withholding information as to the means by which it is produced, but they must not be surprised if practical men form their own conclusions as to the object in view. Such reticence is also somewhat aggravating in view of the effect which the coalite process, if successful, would have on the coal gas industry. In gas works the gas is the staple product, and in coke ovens the coke is the chief thing. The processes are varied as the case may be to get the best results in gas or coke, and the other residuals are regarded as of secondary importance. In the coalite process, gas has to sink into the position of a residual, and coke disappears altogether. The primary product is a material called "Coalite," which is claimed to retain all the good qualities of coal and of coke and to reject the evils of either. It is said to be suitable for use in the ordinary household grate, to give no soot or smoke, to be as combustible as coal under a slow natural draught, and to possess a very high heating value. It is stated that the coal is treated at a comparatively low temperature in iron retorts, and that the residuals are 5,000-candle power of gas, and an increased yield of tar and ammonia as compared with the ordinary coal gas products. I am afraid that gas engineers do not look with favor on increased yields of liquid products. The position as regards tar is sufficiently indicated in the previous paragraph. The results of increased production of ammonia from coke and blast ovens have not been encouraging. The success or otherwise, turns on the commercial vale of the new product, on its ability to substantiate in practice the claims that are put forward on its behalf, and the cost and reliability of the manufacturing process. To some extent it seems a step backward, that a remedy proposed for the smoke nuisance should be a solid and not a gas. Even if a solid dispenses with soot, there is a certain amount of dirt, dust and nuisance inseparable from its use. A product of the nature of coalite must of necessity retain all the mineral matter or ash that is present in the original coal. The great advantage of a gaseous fuel is that it dispenses with the coal cellar and with the ash heap, both important sources of dust and nuisance. Any process, to be a real and complete cure for what is known as the smoke nuisance in our large towns, should eliminate not only the soot but the fine dust, which with some kinds of coal is quite as much a source of nuisance as unconsumed carbonaceous particles.

Considerable attention is now being directed to the question of aerial navigation, either by means of balloons or aeroplanes. The quantity of gas used for filling balloons last year would present a respectable total, and possibly before long this will come in as a substantial line of business. An Italian scientist has pointed out not only that coal gas is very much cheaper than hydrogen, but that its specific gravity can be substantially reduced by very simple means. Probably the process in his mind is the washing out of the heavy hydrocarbons by means of a suitable solvent, which could probably be arranged in simple and inexpensive apparatus. Provided there was a sufficient demand, there are two or three methods by which a gas rich in hydrogen and free from objectionably heavy constituents could be produced. Pure hydrogen costs quite 10 times as much as coal gas at usual prices, so the expense is one of the questions for experiments on an extensive scale.

For some time past investigations have been in progress with a view of ascertaining the presence or otherwise of coal at a workable depth in Kent. There is a general impression that the coal seams successfully worked in South Wales, Gloucester and Somerset extend right across England, forming a continuous line with the collieries on the Continent; but granting their existence, the question has been that of the depth. The Kent Coal Concessions, Ltd., have been making borings near Dover, and announce the discovery of seams having an aggregate thickness of 22 feet at about 1,000 feet below ordnance datum. In other neighboring places they have discovered 10 feet and 7 feet thicknesses, respectively, and some of the samples that have been examined prove high quality gas coal, yielding 12,500 to 13,000 cubic feet of 22 candle power gas. The commercial importance of such a find is very great as the district is closely populated. It is indeed a pleasure and residential neighborhood, so the advent of collieries may be objected to on aesthetic grounds. But the Kent Company will have a nice little corner to themselves, especially as regards the inland towns.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Mr. Paul McMichael, of Philadelphia, has been appointed Superintendent of the Atlanta (Ga.) Gas Light Company, vice Mr. R. C. Congdon, recently appointed Manager of the Company.

"J. F. W.," writing from Philadelphia, under date of the 22d inst., says: "On the 18th inst., Councilman Lewis introduced two ordinances in the City Council, the first of which authorized and empowered the city to give notice to the United Gas Improvement Company of the termination of the gas lease the first of next January. The second authorized suitable advertising for bids for the lease of the works for a period of 20 years, on the basis of a 75-cent gas rate. Both ordinances were referred to the Gas Committee. Conservative opinion is chary of any upheaval with the gas lease since the fiasco of the *Reformers* with the filtration plant. We are getting gas and good gas, of the type the U. G. I. knows how to make, but we are still without water of the filtered sort, save in a few sections of the city; now are the prophets sufficiently willing to risk their reputations as foretellers respecting the time when Philadelphia will get it? Mayor Weaver's Gas Commission ended in a farcical blare, and in an apparent split amongst the three members thereof between themselves—and with how many others is not known—the final act being in a magistrate's court, before which tribunal Mr. Huey publicly withdrew his charges against Mr. Walton Clark of trying to bribe 'the engineer member,' commercial or otherwise, of the Commission. The Company now receives 90 cents per 1,000 cubic feet for gas, a part of which must go to funding a capital account, as the works revert to the city at the end of 1928. The personnel of the two companies recently chartered at Harrisburg, for the ostensible purpose of competing for the lease, is still in the indefinite condition of inception."

Mr. G. W. Shorday, formerly with the Jenkintown and Cheltenham (Pa.) Gas Company, has been appointed Manager of the Mahanoy City (Pa.) Gas Company, vice Mr. R. R. Van Horn. It is proposed to practically relay the entire main system of the Company.

Mr. W. S. Fraser, writing to us under date of the 20th inst., incloses the following: "In the death of Mr. Theodore G. Hulett, whose demise occurred at Niagara Falls, N. Y., the afternoon of April 12th,

has a local interest to those conversant with the earlier history of gas in and about Rochester, N. Y. Deceased, in 1868, in association with J. R. Pettibone, purchased the works of the Warsaw (N.Y.) Gas Light Company, and proceeded to install a new process which he had devised and carried out in Niagara Falls in 1860, and of which he was the manager for 12 years. Previous to this, the Warsaw works had been operated with rosin as the carbon agent, until the Civil War had increased the price of rosin from $1 per barrel to $70, and the works were closed until 1867, when a firm of lawyers in Rochester purchased the Patton patent for making gas from crude petroleum. As these things were the only ones that were out of commission, they purchased them and installed the petroleum process here under the superintendency of Colonel James O. McClure, who ran them until they were purchased by Hulett and Pettibone, who converted them into a naphtha gas works. They were burned in 1871. Steps were then taken for the building of a new set of works upon an enlarged scale, north of the village, and they were incorporated under the name of the Citizens' Gas Company, with a capital stock of $15,000, and have been operated ever since. Upon the installation of an electric plant in this village the two works were consolidated, being now called the Warsaw Gas and Electric Company."

THE main offices of the Parker-Russell Mining and Manufacturing Company have been removed to the Liggett Building, Eighth and Chestnut streets, St. Louis.

THE Worcester (Mass.) Gas Light Company is to construct a new retort house on the Quinsigamond avenue site. The dimension of the structure will be 100 feet in length, 75 feet in width, and 68 feet in height. The structure is to have two stories, is to be of brick and steel, with tile roof. The walls will rest on concrete over pilings. As to the equipment, all we know about it just now is that the same will be furnished by the Riter-Conley Company, from designs by Mr. H. A. Carpenter. The same firm will build the houses.

ABOUT a week ago the City Council of Kendalville, Ind., granted to the Wayne General Construction Company, of Fort Wayne, Ind., a franchise for the operation of a plant for the manufacture and distribution of artificial gas. Under its terms the franchise is to run for 25 years, and the initial rate that may be charged is $1.20 per 1,000 cubic feet, net. The people to whom the franchise was issued are those who are operating the plants at Auburn and Garrett, Ind.

DURING the month of March the output from the municipal gas works, Richmond, Va., was 38,839,358 cubic feet.

THE proprietors of the Evansville (Ind.) Gas and Electric Light Company have purchased a plot of property on Fifth avenue adjacent to the gas works, which rather looks that the Company is contemplating an addition to its generating section.

AT the annual meeting of the shareholders in the York (Pa.) Gas Company the following were elected on the Board of Managers: E. K. McConkey, J. C. Schmidt, George S. Billmeyer, Henry Nes, Charles Kurtz and George Small; President, Grier Hersh.

MR. A. VON DOCHENHAUSEN, who has been connected with the commercial department of the Denver (Col.) Gas and Electric Company, has accepted the position of Manager of the commercial division of the Butte (Col.) Electric and Power Company.

THE Peoples Gas Light and Coke Company, of Chicago, has purchased all right, title and interest to the property, Nos. 9 to 13 Adams street, which purchase gives the Company a frontage of 130 feet on Michigan avenue and a depth of 171 feet on Adams street, a site the dimension of which is ample for the construction of a magnificent office building.

THE legal papers certifying to the formation of the Michigan City Gas and Electric Company, which is a consolidation of the Northern Indiana Gas Company and of the Michigan City Gas and Electric Company, have been filed with the Secretary of State of Indiana. The Company is capitalized in $687,000.

THE general offices of the gas and electrical divisions of the Rutland (Vt.) Railway, Light and Power Company will be removed to the ground floor of the Chaffee building. The location is in the business center of the city.

THE gross earnings of the Laclede Gas Light Company, of St. Louis, Mo., for the past year were $3,524,440; net, $1,499,082.

A CORRESPONDENT in Lexington, Ky., forwards the following: "Some days ago Judge Kirby denied the injunction asked for by H. A. Appling against the Kentucky Heating Company from turning off his gas. The suit was one which has been sidetracked for 2 years pending the settlement of the contest cases, and which is an outcome of the long contest between the Louisville Gas Company and the Kentucky Heating Company. The Louisville Gas Company was granted an injunction against the Kentucky Heating Company, prohibiting it from selling natural gas, mixed with fuel gas, for illuminating purposes. Appling lives on Chestnut street, a half square beyond the end of the Louisville Gas Company's mains. He accordingly cannot get coal gas for lighting, but he could get the natural gas, which is mixed with fuel gas, and he used that supply. When the Court of Appeals affirmed the lower court on the injunction, the Kentucky Heating Company informed him that it would have to turn off his gas, and he sued to restrain that action."

THE historic old gasholder erected for the original Gas Company of Baltimore, Md., in 1850, in the Canton district, was dismantled this month.

THE Athens (O.) Gas Light and Electric Company, as its contribution to the sufferers from the overflow of the Ohio river, remitted one-half the face amount of the March gas bills of those who resided in the flooded districts.

THE following is from the Haverhill (Mass.) *Gazette* of recent date: "The long delayed action to enforce the decree of the State Board of Gas and Electric Light Commissioners regarding the price of gas in Haverhill has been taken, a bill having been filed in the Supreme Court asking for an order from the court enjoining the Haverhill Gas Light Company from continuing to charge $1 per 1,000 feet for gas and requiring them to make the price 80 cents per 1,000 feet, as ordered by the Commission. The three Gas Commissioners, Messrs. Barker, Scharf and Weed, appear as plaintiffs in the action, and the bill recites that in November of 1899 Mayor Chase, of Haverhill, filed a complaint regarding the price of gas sold and delivered by the defendant corporation and that, upon that complaint, notice of a hearing was served upon the Company. A hearing was held and on Feb. 1, 1900, an order was issued by the Commission that the price of gas be thereupon reduced to 80 cents per 1,000. The bill alleges that the defendant corporation has refused to comply with the order and still charges $1 per 1,000 for gas. It is recited that on March 5th notice was sent to the Company of such continued disregard of the order and also to the Attorney-General of the Commonwealth, and that, in pursuance of that notice and of continued failure to comply with the order of the Commission, this bill was brought. An order of notice was issued for a return of the bill on April 30."

HEREAFTER the Utica (N. Y.) Lighting Company will render and collect its accounts monthly instead of quarterly.

THE Eaton (O.) Gas and Electric Company has been incorporated by Messrs. Arthur H. Wyatt and others. It is capitalized in $200,000.

THE Green Fuel Economizer Company, owing to the great increase in its Western business, has been obliged to remove its Chicago headquarters from the Monadnock Block to the Old Colony Building.

MESSRS. GEORGE W. WEISSHAAR, Elbert A. Corbin, Jr., and Abbot C. Levy, figure as the incorporators of the Pocahontas Gas Company, which is to "manufacture and supply gas for light only to the public in city of Philadelphia." They are also the incorporators of the Sterling Gas Light, Heat and Power Company, the "Character and object of which are to manufacture and supply gas to the public in the city of Philadelphia."

IN the Flushing (L. I.) *Journal* for the 16th inst., Mr. Chas. G. M. Thomas, who was recently elected Vice-President and General Manager of the New York and Queens Electric Light and Power Company, and who has acted for a long time in like dual capacity for the New York and Queens Electric Light and Power Company, said to a reporter for that paper: "You can say most positively that there has not been any consolidation of the Companies and the developments within the next few days prove it. They will continue as they have been, separate and distinct."

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NOTIFICATION RESPECTING ADVERTISING.

Orders for new advertising, or for changes in standing advertisements, to insure attention in the issue following their reception, must be in hand any time of Wednesday.

AGENTS:

New York—American News Co., 39 and 41 Chambers St.
Germany—Lemcke & Buechner, of New York.
England—Aug. Siegle, 30 Lime Street, London.

MONDAY, APRIL 29, 1907.

The Market for Gas Securities.

The city gas share market for the week was mainly notable for a quick movement in Brooklyn Union, the bid price for which was advanced 10 points, without the dislodging of any stock. The quotation this morning (Friday) was 118 to 125. Keep taking notice respecting Brooklyn Union. Consolidated is 133 to 133½, and June should see it at 150.

Peoples, of Chicago, is 92½ to 93, with a right good inquiry for it. Massachusetts gas is again beyond 62, and if an increase in business counts for anything this stock counts for much. Washington, D. C., has again passed the 300 mark.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

APRIL 29.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	133	133½
Central Union Gas Co.—				
1st 5's, due 1972, J. & J.	3,000,000	1,000	101	104
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	..	105
Mutual	2,500,000	100	190	225
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000 000	1,000	99	100
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	37	43
1st Mtg. Gold Bds. 5 p.ct.	1,000,000	..	98	104
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	101	103
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	108	111
Con. 5's, due 1945, J. & J.	1,500,000	..	104	110
Standard	5,000,000	100	140	160
Preferred	5,000,000	100	155	175
1st Mtg. 5's, due 1930, M. & N	1,500,000	1,000	104	108
The Brooklyn Union	15,000,000	1,000	115	125
1st Con. 5's, due 1948, M. & N	15,000,000		107	..
Yonkers	299,650	500	120	..
Out-of-Town Companies.				
Bay State	50,000,000	50	¼	⅝
" Income Bonds	2,000,000	1,000	..	75
Binghamton Gas Works	450,000	100	..	65
" 1st Mtg. 5's	509,000	1,000	95	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	9	10
" " Bonds, 5's	5,250,000	1,000	75	80
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	106¾
Cincinnati Gas and Electric Co.	29,500,000	100	98½	99
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	90	..
Columbus (O.) Gas Lt. & Heating Co	1,683,750	100	87	88
Preferred	3,026,500	100	107½	108
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	.	90
Mortgage, 6's	3,500,000	..	..	118
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	..	..	100
Detroit City Gas Co	5,000,000	50	..	50
" Prior Lien 5's	4,613,000	1,000	..	98
Detroit Gas Co., 5's	381,000	1,000	75	80
" Inc. 5's	16,000	100	98½	100
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	39	40
Fort Wayne	2,000,000	..	..	..
" Bonds	2,000,000	..	55	..
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	..	110	112
Bonds, 5's	10,500,000	..	107½	108½
Indianapolis	2,000,000	..	60	70
" Bonds, 5's	2,050,000	..	104½	105
Jackson Gas Co	250,000	50	82	..
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	..	05
Preferred	2,500,000	100	95	110
Bonds	10,000,000	1,000	104	104½
Lafayette Gas Co., Ind.	1,000,000	100	..	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas & Elec. Co.				
" 1st Mtg. 6's	350,000	1,000	106	108¾
" 6 per cent. scrip, due 1910	100,000	25	85	87
Massachusetts Gas Companies of Boston	25,000,000	100	62½	63
Preferred	25,000,000	100	86	86¼
Montreal, Canada	2,000,000	100	218	218½
Nashville Gas Lt. Co.	1,000,000	100	110	.
Newark, N. J., Con. Gas Co.	6,000,000	..	56	58
Bonds, 6's	6,000,000	..	137	138
New Haven	2,000,000	25	200	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	92½	93¼
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
" 2d "	2,500,000	1,000	104	..
Rochester Gas & Elec. Co.	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	104½	105¼
San Francisco, Cal.	15,500,000	100	..	..
St. Joseph Gas Co. 1st Mtg. 5's	751,000	1,000	92	..
St. Paul Gas Light Co	1,500,000	100	45	47
1st Mortgage 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	2,465,000	1,000	96¼	..
Syracuse, N. Y.	1,975,000	100	50	55
Bonds	2,047 000	1,000	102	..
Washington, D. C	2,500,000	20	300	305
First mortgage 6's	600,000	..	..	..
Western, Milwaukee	4,000,000	..	..	..
Wilmington, Del.	600,000	50	200	..

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ANNUAL MEETING.

OFFICE OF THE UNITED GAS IMPROVEMENT CO.,
N. W. CORNER BROAD AND ARCH STS.,
PHILADELPHIA, April 18, 1907.

The Annual Meeting of the Stockholders of The United Gas Improvement Company will be held at the office of the Company, Northwest Corner of BROAD AND ARCH STREETS, PHILADELPHIA, Monday, May 6, 1907, at 12 o'clock, noon, when an election will be held for a President and six (6) Directors, to serve for the ensuing year, and such other business transacted as may be brought before the meeting. The stock transfer books will be closed from 3 P.M., Wednesday, April 24, until 10 A.M., Tuesday, May 7.

1063-2 W. F. DOUTHIRT, Secretary.

Estimates furnished for the erection of complete gas works or the extension and modernizing of old works. All work warranted. Both water gas and coal gas.

EMPIRE GAS IMPROVEMENT & CONSTRUCTION COMPANY,
1628-tf 49 Wall Street, New York

Position Wanted.

A Capable Manager and Superintendent,

Now employed, desires a position as manager or superintendent of gas, or combined gas and electric plants, in city of 15,000 to 25,000 population. Successful record. Southern or Middle States location preferred.

Address, "P. T. A.,"
1641-tf Care this Journal.

MISS HELEN S. BEVERIDGE,

PRACTICAL LECTURER ON "COOKING WITH GAS."

Endorsed by well known companies. Address 625 EAST 24TH STREET,
1664-3 PATERSON, N. J.

Position Wanted

As Solicitor and Appliance Man.

Twelve years' practical experience in distribution work. Can also take charge of fitting department and collecting. A-No. 1 references as to ability as solicitor and all-round distribution man. Address, "S. & F. D.,"
1661-2 Care this Journal.

WANTED,

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By young married man of 16 years' experience in all its branches. Is now superintendent of gas company of 30,000,000 cubic feet. Will have to give present company 60 days' notice. Best of references.

1652-tf Address, "CAPABLE," care this Journal.

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Position as Manager or Superintendent of medium sized gas company, or as head of distribution or street department of a large works. At present superintendent of distribution of a concern with 400 miles of main and a daily sendout of 6,000,000. Best of references and good reasons for wishing a change.

1663-3 Address, "C. B. A.," care this Journal.

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AN ASSISTANT SUPERINTENDENT FOR A COAL GAS PLANT

In a town of 20,000 inhabitants. State experience and salary expected. Address

CAIRO CITY GAS COMPANY,
1664-2 CAIRO, ILLS.

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MAIN AND SERVICE LAYERS AND GASFITTERS.

Good wages to satisfactory men. Apply to QUEBEC GAS COMPANY,
1664-3 QUEBEC, CANADA.

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A First-Class, Experienced Solicitor,

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Experienced on Lowe apparatus. Good opening for an energetic, reliable man. Near New York. State age, experience and salary expected.

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An All-Round Repair Man for Gas Works in the Middle West.

One who can do repairs around works and who has had some experience in house piping.

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1664-3 Care this Journal.

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Two Sets of Purifiers, 4 boxes in each set. Size, 16 feet by 24 feet by 4 feet deep; 24-inch seals, 30-inch connections. Rotary center valve and by-pass.

Also One Set of Four Purifiers, 20 feet by 20 feet by 39 inches deep; 24-inch seals; 16-inch connections. Rotary center valve.

All the above boxes are complete, with covers, lifting carriages and reversible trays.

Also Five Station Meters, as follows:

One 12 feet diameter by 12 feet 2 inches long; 30-inch connections.

One 12 feet 6 inches diameter by 12 feet 9 inches long; 20-inch connections.

One 11 feet 6 inches diameter by 11 feet 6 inches long; 16-inch connections.

Two 8 feet 6 inches diameter by 7 feet long; 12-inch connections.

All the above station meters have 4 partitions and were built by the American Meter Company.

Also Two Single Lift Gasholders in brick tanks, 50,000 cubic feet capacity each, and giving about 5½ inches pressure

For further information, apply to

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1664-1 Baltimore, Md.

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I have a new continuous process for manufacture of producer gas, water gas, coal gas. The apparatus and process patented lately. Cost of plant and cost of manufacture lower than ever before known for equal service. Works satisfactorily in small or large units. Rights of territory for sale.

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DAYTON GAS LIGHT AND COKE CO.,
1663-4 DAYTON, O.

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RETIRING FROM BUSINESS.

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Will repair and put in first-class order.

For information and prices write to

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Alcohol its Manufacture from Farm Products and De-Naturing. By F. B. WRIGHT.

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For Students in Gas Manufacture.

ELEMENTARY, ADVANCED AND CONSTRUCTIONAL.

Three Volumes. Price, $1.50 each. For Sale by

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42 Pine Street, New York City.

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BANKERS,
Land Title Building, Philadelphia, Pa.

GAS AND ELECTRIC PROPERTIES BOUGHT AND SOLD.
We Have Several Attractive Properties for Sale at this Time.

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NO EXTRA LABOR OR OPERATING EXPENSES.

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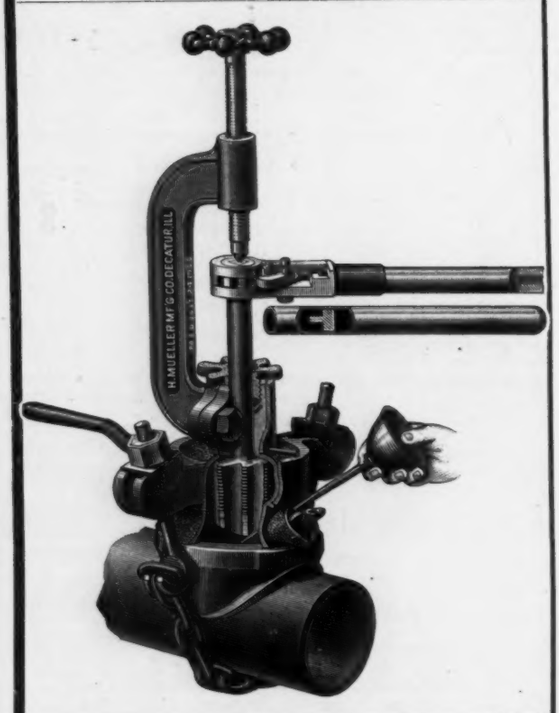

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They are made for making taps up to 4 inches.

They will do better everything that any other machine will do, and without giving you any trouble.

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Compagnie pour la Fabrication des Compteurs et Materiel d'Usines à Gaz,
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The 4,000,000 Cubic Foot Per Day

ROTARY STATION METER

FOR THE

CONSOLIDATED GAS COMPANY OF NEW YORK.

Dimensions: Base 84 in.; Face to Face, Flanges 108 in.; Height 99½ in.; Connections 20 in.

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This ***Four Million*** foot Rotary Meter is about to be installed at the 21st Street station of the Consolidated Gas Company in the City of New York.

One-half the Cost—One-tenth the Space.

When in Need of Station Meters

write

ROTARY METER COMPANY,

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P. PLANTINGA, President W. E. STEINWEDELL, Secretary

THE GAS MACHINERY CO.,

Main Office and Shops

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NEW YORK OFFICE, - - - 56 PINE STREET.

COAL AND WATER GAS APPARATUS,
EXHAUSTERS, CONDENSERS, SCRUBBERS,
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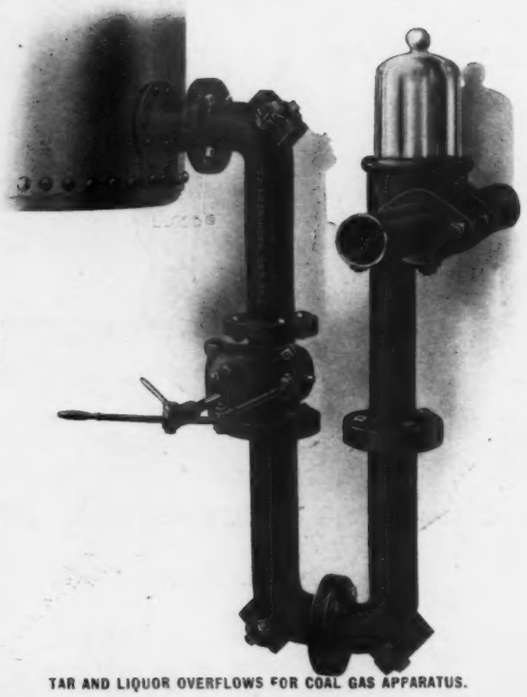
BY PRODUCT MACHINERY,
COMPLETE GAS PLANTS.



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Parker-Russell Mining and Mfg. Co.,

ST. LOUIS, MO.

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GAS RETORTS AND FIREBRICK.

We Manufacture Gas Retorts and Settings, Furnace Blocks and Fireclay Tiles of every description.

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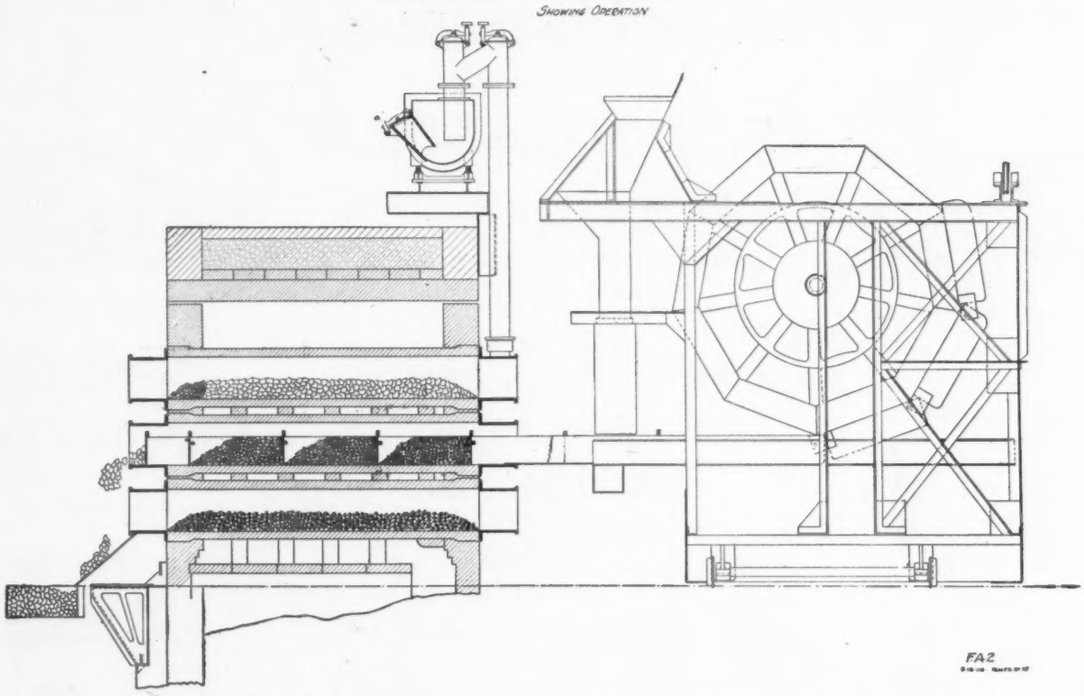
SHOWING OPERATION



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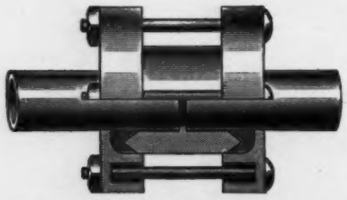
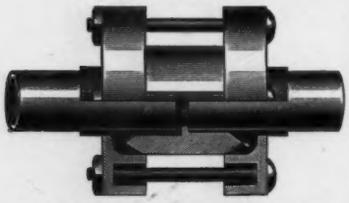
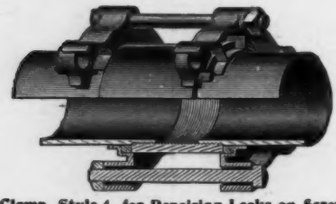
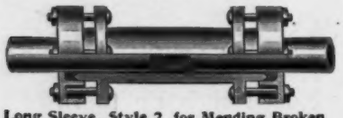

Regular Coupling, Style 1, for Plain End Wrought Iron Pipe.


Insulating Coupling, Style 5, for Plain End Wrought Iron Pipe,


Clamp, Style 4, for Repairing Leaks on Screw Collar.


Long Sleeve, Style 2, for Mending Broken Lines.

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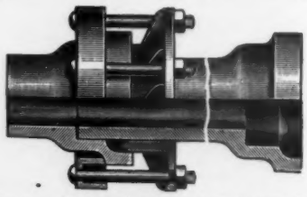
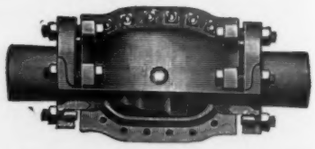
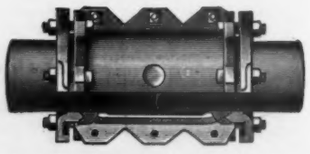
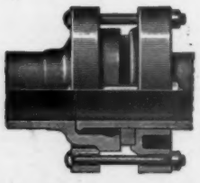

Coupling, Style 9, for Special Style Cast Iron Pipe.


Split Sleeve for Repairing Broken Bell on Cast Iron Pipe.


Split Sleeve for Repairing Broken or Cracked Cast Iron Pipe.


Clamp, Style 4½, for Repairing Leaky Lead or Cement Joints in Cast Iron Pipe.

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Ceiling Chandelier.

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One displayed in the window will prove a wonderful business-bringer.

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NO DUMPING OF METERS TO GET THE WATER OUT.

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Prevents Danger of Accidental Asphyxiation.

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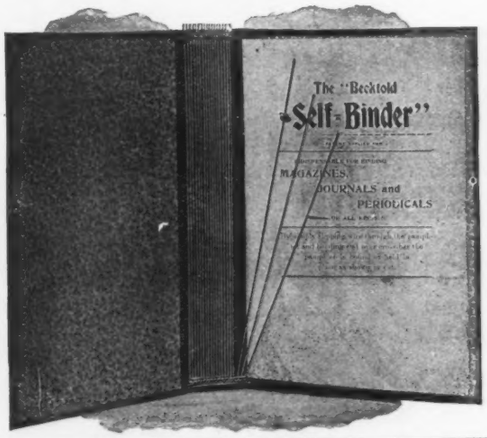

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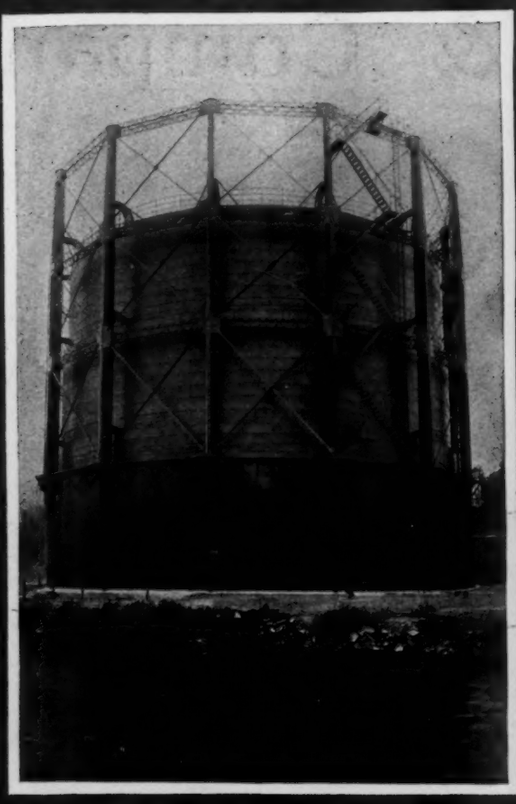

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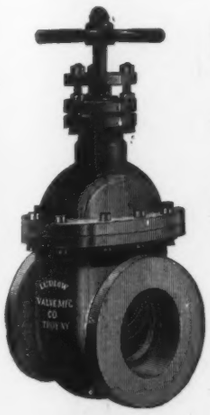

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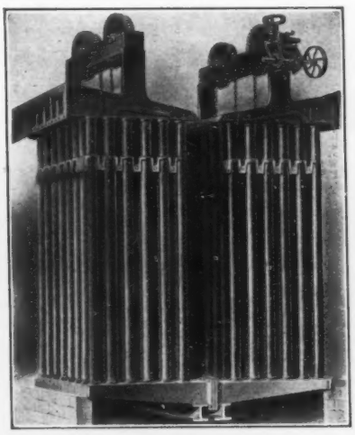

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These heaters differ in size only.

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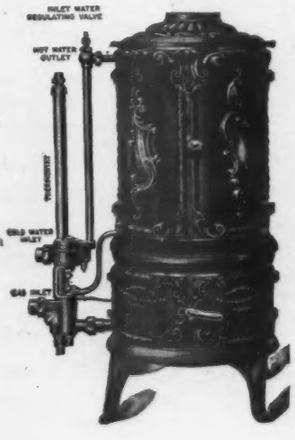

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The Most Perfect Water Heaters of the Kind on the Market.

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GUARANTEE.

When these heaters are connected exactly as directed on the card of instructions set with each heater—and are supplied with gas testing 650 heat units—

We guarantee that the Humphrey Heater will raise 1 gallon of water 1° F. for every cubic foot of gas burned.

We guarantee each heater for 1 year, perfect in operation, construction, material and workmanship.

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Minimum Back Pressure,
Complete Safety.

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Stand so High in the estimation of those using them?

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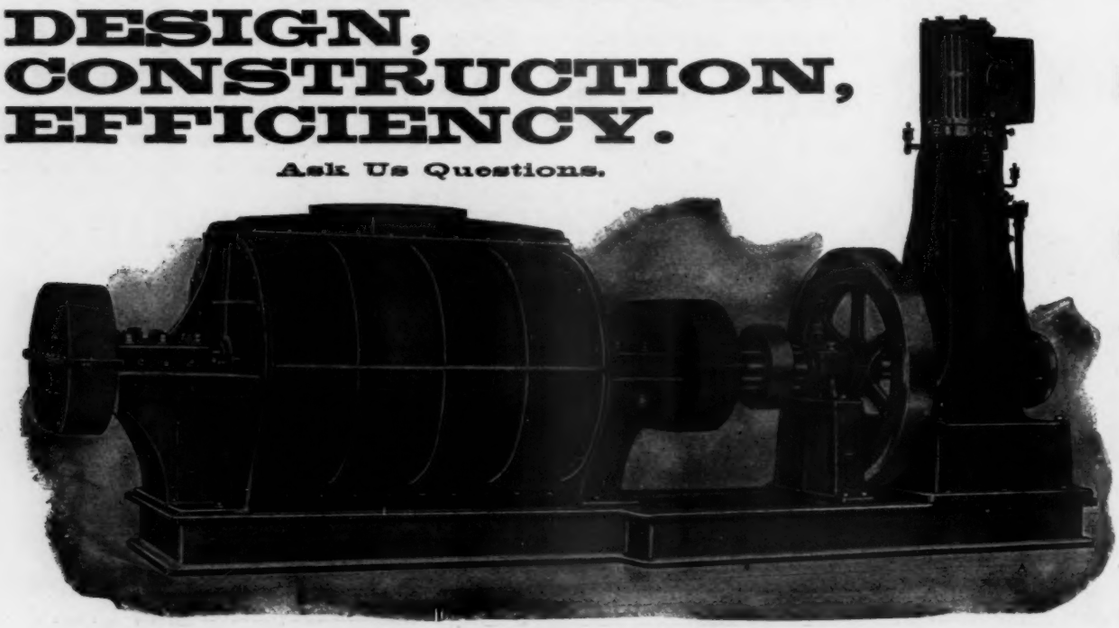
DESIGN, CONSTRUCTION, EFFICIENCY.

Ask Us Questions.



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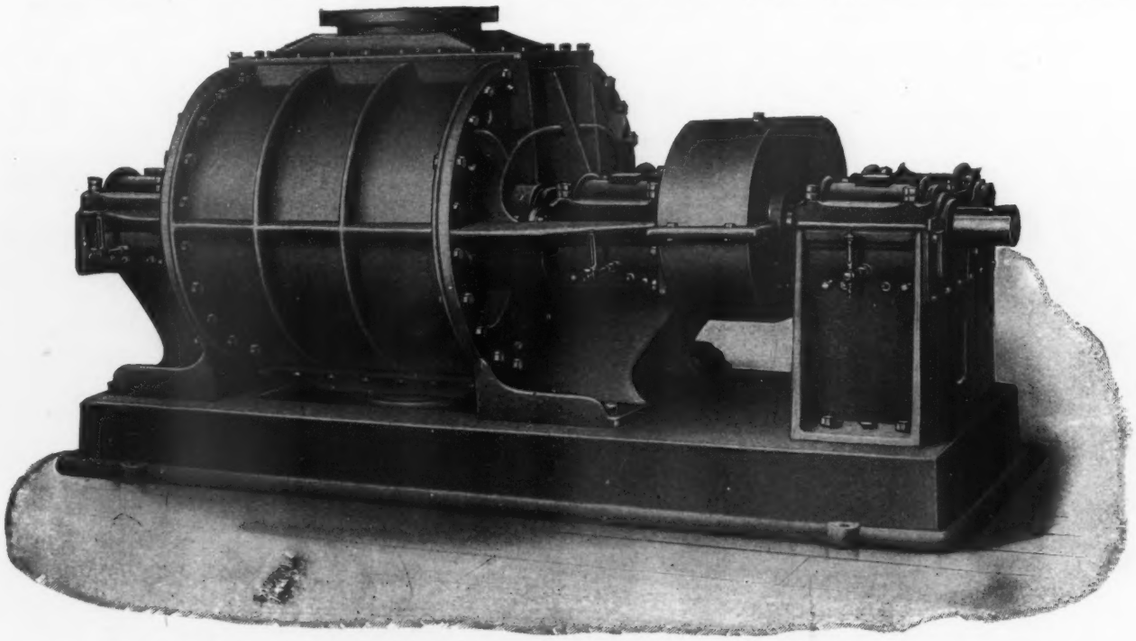

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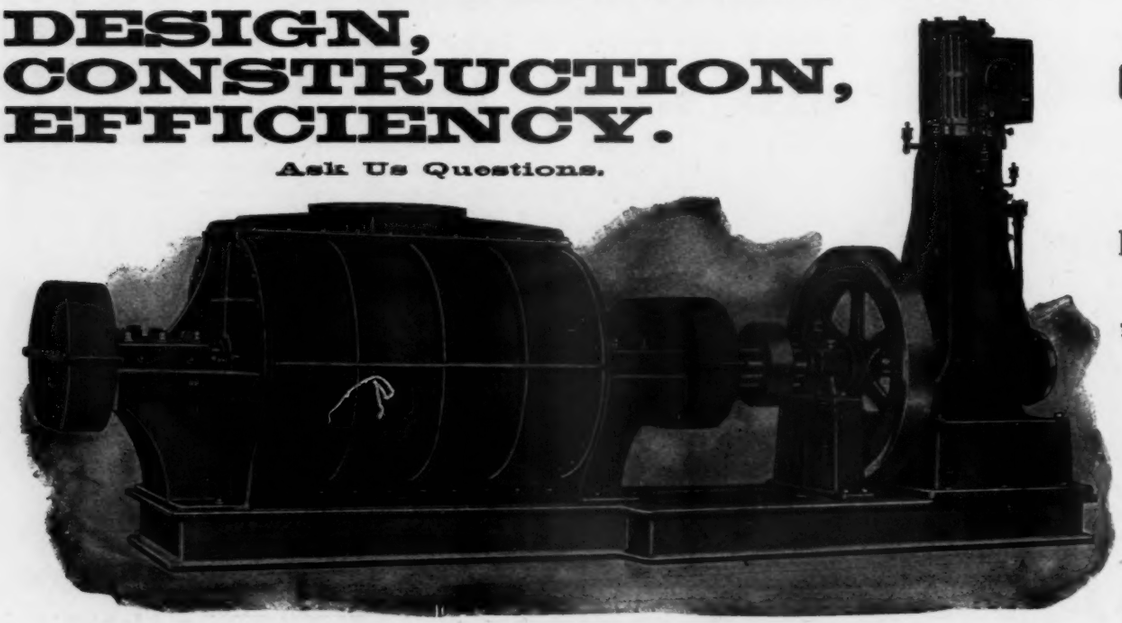

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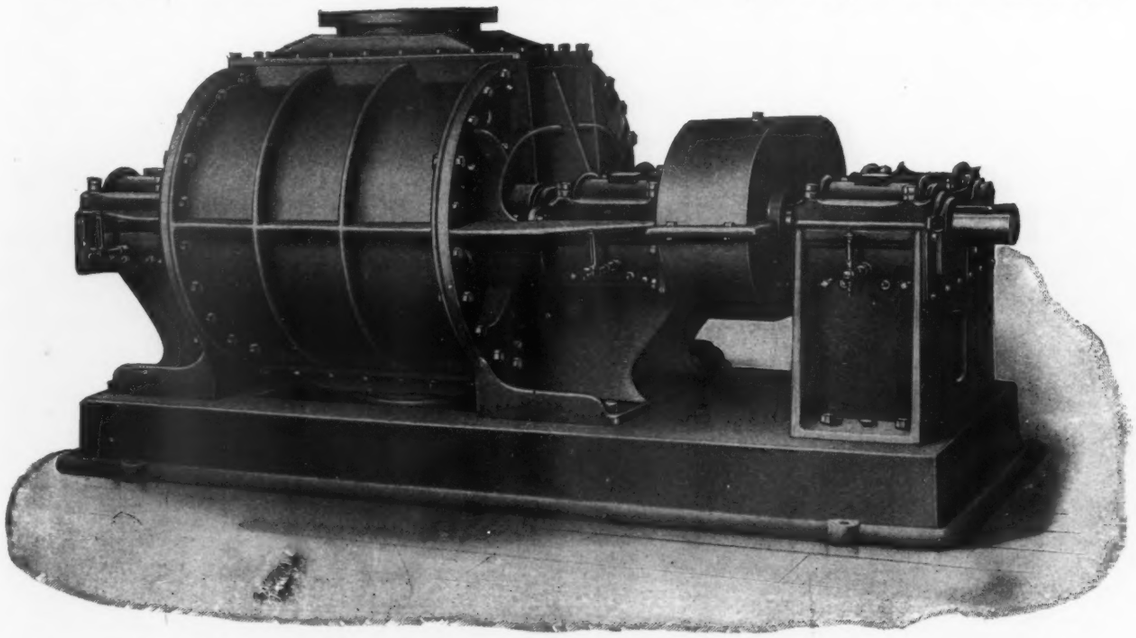

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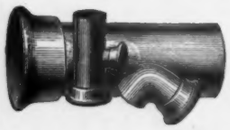

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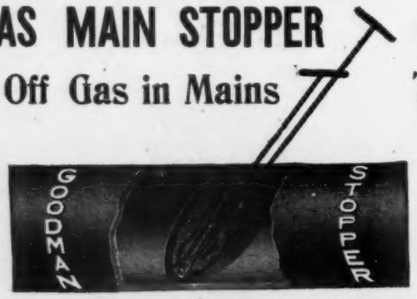

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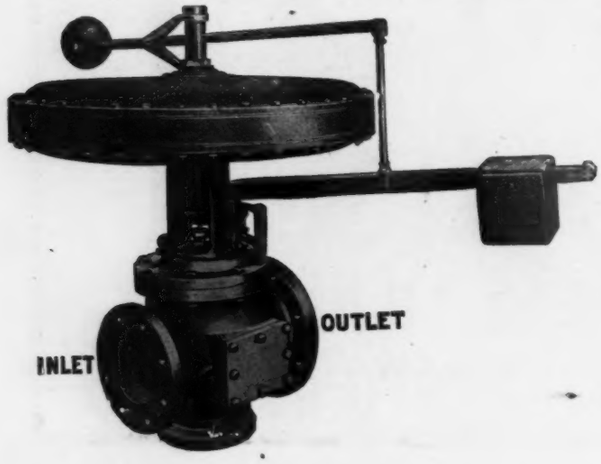

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Our DUPLEX SENSITIVE GOVERNOR, with Automatic Cutoff for district service, will reduce high pressure gas to inches of water without variation.

Absolutely safe and reliable. No complicated mechanism to get out of order. More than 20 years' experience with the largest gas companies.

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AMERICAN METER CO.,

NEW YORK, ST. LOUIS, PHILADELPHIA, SAN FRANCISCO, CHICAGO,

Photometrical and Experimental Apparatus.

PUBLIC LIGHTING TABLE.

MAY, 1907.

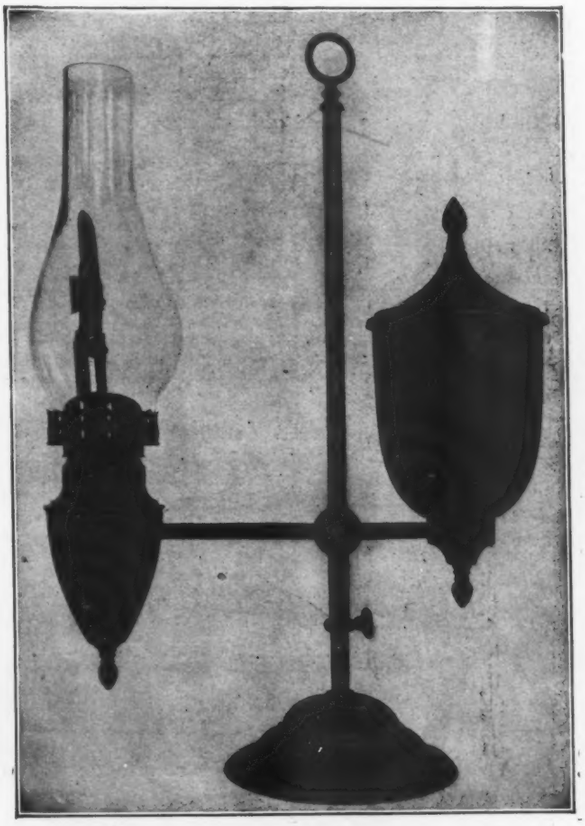
Table No. 1.
FOLLOWING THE MOON.

Day of Week.	Date.	Light.	Extinguish.
Wed.	1	7.20 PM	12.00 PM
Thu.	2	7.20	1.00 AM
Fri.	3	7.20	1.50
Sat.	4	7.20 LQ	2.40
Sun.	5	7.30	3.20
Mon.	6	7.30	3.50
Tue.	7	7.30	3.50
Wed.	8	7.30	3.50
Thu.	9	7.30	3.50
Fri.	10	7.30	3.50
Sat.	11	7.30 NM	3.50
Sun.	12	7.40	3.50
Mon.	13	7.40	3.50
Tue.	14	7.40	3.50
Wed.	15	7.40	3.50
Thu.	16	10.00	3.50
Fri.	17	10.40	3.50
Sat.	18	11.20	3.50
Sun.	19	12.00	3.40
Mon.	20	12.30 AM FQ	3.40
Tue.	21	1.00	3.40
Wed.	22	1.30	3.40
Thu.	23	2.00	3.40
Fri.	24	2.30	3.40
Sat.	25	3.10	3.40
Sun.	26	No L.	No L.
Mon.	27	No L FM	No L.
Tue.	28	No L.	No L.
Wed.	29	7.50 PM	10.50 PM
Thu.	30	7.50	11.50
Fri.	31	7.50	12.40 AM

TOTAL HOURS DURING 1907.

By Table No. 1.

	Hrs.Min.
January	211.10
February	193.40
March	182.10
April	167.00
May	157.00
June	145.30
July	151.50
August	162.30
September	175.30
October	202.40
November	209.30
December	231.50
Total, yr.	2190.20



THE ELLIOTT KEROSENE STANDARD PHOTOMETER LAMP.

10-Candle Power.

This lamp is a perfect substitute for the 10-candle Pentane Lamp hitherto used, and has the following advantages:

1st. It uses Standard Kerosene Oil (Pratt's Astral Oil or equivalent).

2d. It is remarkably steady. Will burn 24 hours continuously with less than 2 per cent. variation.

3d. It is much less dangerous than Pentane, which is a kind of gasolene.

4th. It is not easily affected by air currents in the photometer room.

5th. Since the lamp may burn continuously, the candle power of gas may be taken at any moment, if necessary. This insures steady illuminating power without waste of carburetting material.

6th. The first cost of the lamp brings it within the reach of even small gas works.

7th. Costs much less to maintain than a Pentane lamp or sperm candles doing the same service.

8th. Is not affected by the weather.

PUBLIC LIGHTING TABLE.

MAY, 1907.

Table No. 2.
NEW YORK CITY.
ALL NIGHT LIGHTING.

Day of Week.	Date.	Light	Extinguish.
		P. M.	A.M.
Wed.	1	6.45	4.00
Thu.	2	6.45	4.00
Fri.	3	6.45	4.00
Sat.	4	6.45	4.00
Sun.	5	6.45	4.00
Mon.	6	6.45	4.00
Tue.	7	6.55	3.40
Wed.	8	6.55	3.40
Thu.	9	6.55	3.40
Fri.	10	6.55	3.40
Sat.	11	6.55	3.40
Sun.	12	6.55	3.40
Mon.	13	6.55	3.40
Tue.	14	7.00	3.30
Wed.	15	7.00	3.30
Thu.	16	7.00	3.30
Fri.	17	7.00	3.30
Sat.	18	7.00	3.30
Sun.	19	7.00	3.30
Mon.	20	7.00	3.30
Tue.	21	7.10	3.15
Wed.	22	7.10	3.15
Thu.	23	7.10	3.15
Fri.	24	7.10	3.15
Sat.	25	7.10	3.15
Sun.	26	7.10	3.15
Mon.	27	7.10	3.15
Tue.	28	7.15	3.15
Wed.	29	7.15	3.15
Thu.	30	7.15	3.15
Fri.	31	7.15	3.15

TOTAL HOURS DURING 1907.

By Table No. 2.

	Hrs.Min.
January	423.20
February	355.25
March	355.35
April	298.50
May	264.50
June	234.25
July	243.45
August	280.25
September	321.15
October	374.30
November	401.40
December	433.45
Total, yr.	3987.45

NEW YORK, 318 West 42d Street. BOSTON, 820 Beacon Building. PHILADELPHIA, Broad and Arch Streets. ST. LOUIS, 712 Roe Building. CHICAGO, 218 La Salle Street. SAN FRANCISCO, 512 Oak Street.

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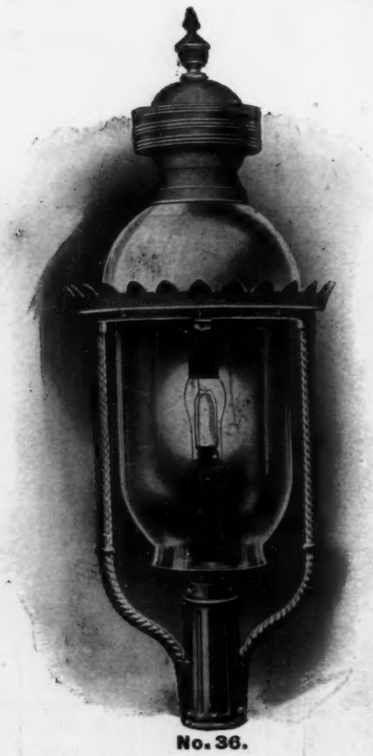
....OF AMERICA....



No. 36.

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Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

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Succeeds and Excels the Electric Light at One-Quarter the Cost.

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Perfect Combustion.
Lowest Gas Consumption.
Highest Candle Power.
Will Fit Any Fixture.
Will Not Flash Back.
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Memphis, Tenn. (2d contract).
Council Bluffs, Ia. (2d contract).
Seattle, Wash. (2d contract).
Philadelphia, Pa.
Waterbury, Conn.
Manchester, N. H.
Allentown, Pa.
Omaha, Neb.
Muskegon, Mich.
Nazareth, Pa. (2d contract).
Lewistown, Pa.
Greenville, Tex.
New York, Cent. Un. (3d contract).
Jefferson City, Mo.
Peekskill, N. Y. (2d contract).
Waterville, Me.
Washington, D. C. (4th contract).
Lawrence, Mass. (3d contract).
Hampton, Va.
Aurora, Ills. (2d contract).
Milwaukee, Wis.
Syracuse, N. Y. (2d contract).
Davenport, Ia.
S. Brooklyn, N. Y. (3d contract).
Delray, Mich.
Albert Lea, Minn. (2d contract).
Leominster, Mass. (2d contract).
Clinton, Mass.

TOTAL SETS INSTALLED IN 1906, ... 41
TOTAL SETS TO DATE, ... 634
TOTAL DAILY CAPACITY, ... 502,555,000 cu. ft.

Tar Extractors for Carburetted Water Gas.
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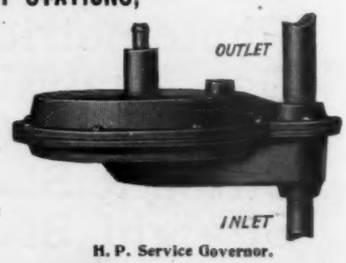

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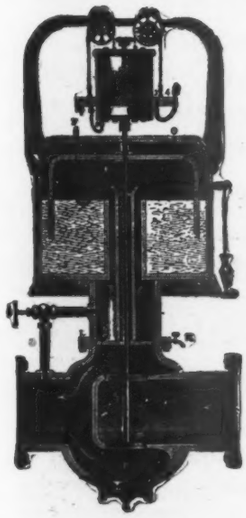

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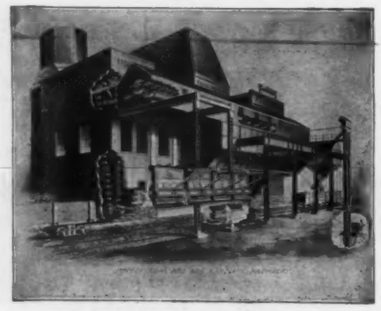

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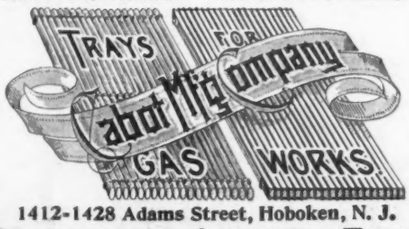

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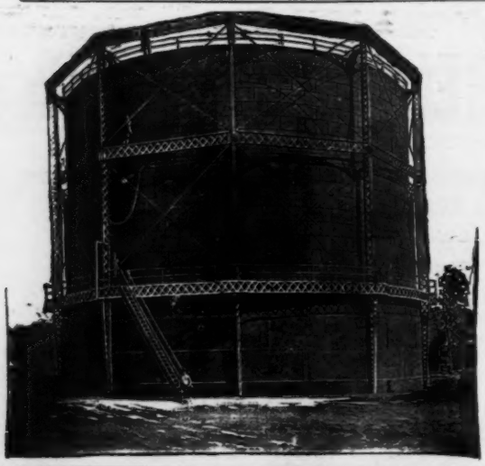

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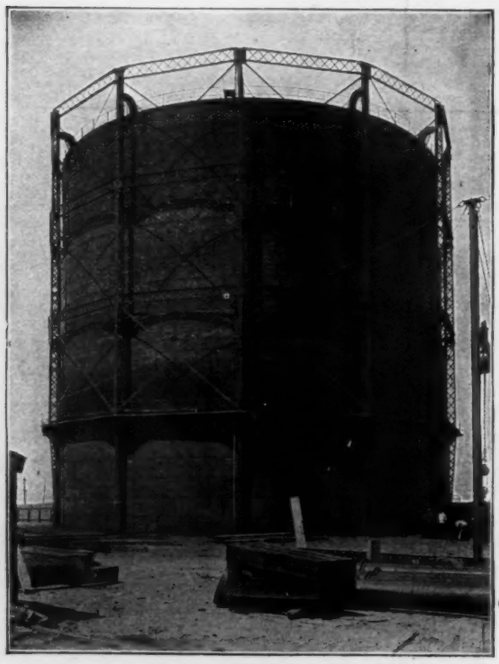

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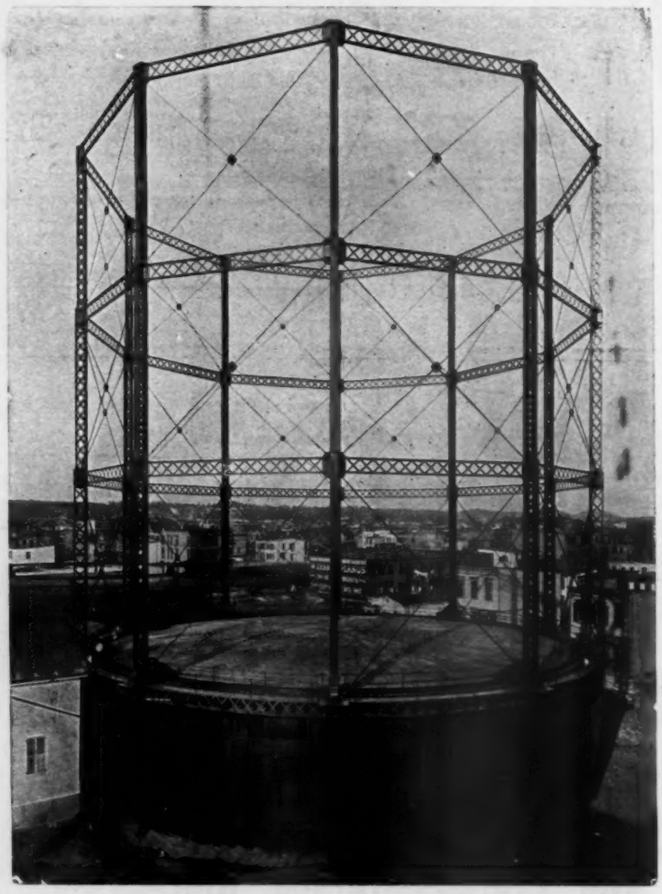

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